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1847 CHADWICK, SIR EDWIN, K.C.B., Corresponding Member of the Academy of Moral and Political Sciences of the Institute of France; Park Cottage, East Sheen.

1887 FLOWER, WILLIAM HENRY, C.B., LL.D., F.R.S., Director of the Natural History Department, British Museum, Cromwell road.

1887 FOSTER, MICHAEL, LL.D., F.R.S., Professor of Physiology in the University of Cambridge.

1883 FRANKLAND, EDWARD, M.D., D.C.L., Ph.D., F.R.S., Corresponding Member of the French Institute; The Yews, Reigate Hill, Reigate.

1868 HOOKER, SIR JOSEPH DALTON, C.B., M.D., K.C.S.I., D.C.L., LL.D., F.R.S., Member of the Senate of the University of London, Director of the Royal Botanic Gardens, Kew; Corresponding Member of the Academy of Sciences of the Institute of France; The Camp, Sunningdale.

1868 HUXLEY, THOMAS HENRY, LL.D., D.C.L., F.R.S., late Professor of Natural History in the Royal School of Mines; Corresponding Member of the Academies of Sciences of St. Petersburg, Berlin, Dresden, &c.; 4, Marlborough place, St. John's wood.

1878 LUBBOCK, SIR JOHN, Bart., M.P., D.C.L., LL.D., F.R.S., High Elms, Hayes, Kent.

1847 OWEN, SIR RICHARD, K.C.B., D.C.L., LL.D., F.R.S., late Superintendent of the Natural History Departments in the British Museum; Foreign Associate of the Academy of Sciences of the Institute of France; Sheen Lodge, East Sheen, Mortlake.

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1883 PARKER, WILLIAM KITCHEN, F.R.S., Crowland, Trinity road, Upper Tooting.

1873 STOKES, SIR GEORGE GABRIEL, Bart., M.A., D.C.L., LL.D., F.R.S., M.P., Lucasian Professor of Mathematics in the University of Cambridge; President of the Royal Society; Lensfield Cottage, Cambridge.

1867 TURNER, SIR WILLIAM, LL.D., D.C.L., F.R.S., Professor of Anatomy in the University of Edinburgh.

1868 TYNDALL, JOHN, D.C.L., LL.D., F.R.S., Honorary Professor of Natural Philosophy in the Royal Institution; Corresponding Member of the Academies and Societies of Sciences of Göttingen, Haarlem, Geneva, &c.; Hind Head House, Shotter Mill, near Petersfield.

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1883 BIGELOW, HENRY J., M.D., Professor of Surgery at Harvard University, and Surgeon to the Massachusetts General Hospital.

1887 BILLINGS, JOHN S., M.D., D.C.L. Oxon., Surgeon U.S.Army; Librarian, Surgeon-General's Office, Washington.

1876 BILLROTH, THEODOR, M.D., Professor of Surgery in the University of Vienna; 20, Alger Strasse, Vienna.

1883 CHARCOT, J. M., M.D., Physician to the Hôpital de la Salpêtrière, and Professor at the Faculty of Medicine of Paris; Member of the Academy of Medicine; Quai Malaquais 17, Paris.

1883 DUBOIS REYMOND, EMIL, M.D., Professor in Berlin; N. W. Neue Wilhelmstrasse 15, Berlin.

1887 ESMARCH, FRIEDRICH, M.D., Professor of Surgery in the University of Kiel.

1866 HANNOVER, ADOLPH, M.D., Professor at Copenhagen.

1873 VON HELMHOLTZ, HERMANN LUDWIG FERDINAND, Professor of Physics and Physiological Optics; Berlin.

1873 HOFMANN, A. W., LL.D., Ph.D., Professor of Chemistry Berlin.

1868 KÖLLIKER, ALBERT, Professor of Anatomy in the University of Würzburg.

Elected

1868 LARREY, HIPPOLYTE BARON, Member of the Institute of France; Inspector of the "Service de Santé Militaire," and Member of the "Conseil de Santé des Armées;" Commander of the Legion of Honour, &c.; Rue de Lille, 91, Paris.

1883 PASTEUR, LOUIS, LL.D., Member of the Institute of France (Academy of Sciences).

1878 SCANZONI, FRIEDREICH WILHELM VON, Royal Bavarian Privy Councillor; Professor of Midwifery in the University of Würzburg.

1856 VIRCHOW, RUDOLPH, M.D., LL.D., Professor of Pathological Anatomy in the University of Berlin; Corresponding Member of the Academy of Sciences of the Institute of France; 10, Schellingstrasse, Berlin.

1887 VON VOLKMANN, RICHARD, Professor in Halle.

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SEPTEMBER, 1889.

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1846 *ABERCROMBIE, JOHN, M.D.

1877 †ABERCROMBIE, JOHN, M.D., Assistant Physician to, and Lecturer on Forensic Medicine at, Charing Cross Hospital; 23, Upper Wimpole street, Cavendish square. *Trans.* 1.

1885 ABRAHAM, PHINEAS S., M.A., M.D., Lecturer on Physiology and Histology at the Westminster Hospital; 11, Nottingham place.

1851 *ACLAND, SIR HENRY WENTWORTH, K.C.B., M.D., LL.D., F.R.S., Honorary Physician to H.R.H. the Prince of Wales; Regius Professor of Medicine in the University of Oxford; Broad street, Oxford.

Elected

1885 ACLAND, THEODORE DYKE, M.D., Assistant Physician to St. Thomas's Hospital and to the Hospital for Consumption and Diseases of the Chest, Brompton; 7, Brook street, Hanover square.

1852 †ADAMS, WILLIAM, Surgeon to the Great Northern Hospital and to the National Hospital for the Paralysed and Epileptic; Consulting Surgeon to the National Orthopædic Hospital, Great Portland street; 5, Henrietta street, Cavendish square. C. 1873-4. *Trans.* 3.

1867 AIKIN, CHARLES ARTHUR, 7, Clifton place, Hyde Park.

1837 *AINSWORTH, RALPH FAWSETT, M.D., Consulting Physician to the Manchester Royal Infirmary; Cliff Point, Lower Broughton, Manchester.

1839 ALCOCK, SIR RUTHERFORD, K.C.B., K.C.T., K.T.S., D.C.L., late H.M.'s Envoy Extraordinary at the Court of Pekin. *Trans.* 1.

1866 ALLBUTT, THOMAS CLIFFORD, A.M., M.D., LL.D.Glasgow, F.R.S., Commissioner in Lunacy; Consulting Physician to the Leeds General Infirmary; 3, Melbury Road, Kensington. *Trans.* 3.

1879 ALLCHIN, WILLIAM HENRY, M.B., F.R.S. Ed., Physician to, and Lecturer on Medicine at, the Westminster Hospital; 5, Chandos street, Cavendish square.

1863 ALTHAUS, JULIUS, M.D., Senior Physician to the Hospital for Epilepsy and Paralysis, Regent's Park; 48, Harley street, Cavendish square. *Trans.* 2.

1884 ANDERSON, ALEXANDER RICHARD, Surgeon to the General Hospital, 5, East Circus Street, Nottingham.

1881 ANDERSON, JAMES, A.M., M.D., Assistant Physician to the London Hospital; 84, Wimpole street, Cavendish square.

1888 ANDERSON, JOHN, M.D., C.I.E., Physician to the Seamen's Hospital, Greenwich; 105, Gloucester place, Portman square.

1862 ANDREW, JAMES, M.D., *Vice-President*, Physician to, and Lecturer on Medicine at, St. Bartholomew's Hospital; 22, Harley street, Cavendish square. S. 1878-9. C. 1881-2. V.P. 1888. *Trans.* 1.

Elected

1880 *APPLETON, HENRY, M.D., Staines.

1888 ARKLE, CHARLES JOSEPH, M.B.; University College Hospital.

1874 AVELING, JAMES H., M.D., Physician to the Chelsea Hospital for Women; 1, Upper Wimpole street, Cavendish square.

1851 *BAKER, ALFRED, Consulting Surgeon to the Birmingham General Hospital; 3, Waterloo street, Birmingham.

1873 *BAKER, J. WRIGHT, Senior Surgeon to the Derbyshire General Infirmary; 22, Hawkshead street, Southport, Lancashire.

1865 BAKER, WILLIAM MORRANT, Surgeon to, and Lecturer on Physiology at, St. Bartholomew's Hospital; Consulting Surgeon to the Evelina Hospital for Sick Children; 26, Wimpole street, Cavendish square. C. 1878-9. V.P. 1889. *Referee*, 1886-8. *Lib. Com.* 1876-7. *Trans.* 7.

1869 BAKEWELL, ROBERT HALL, M.D., Ross, Westland, New Zealand.

1839 †BALFOUR, THOMAS GRAHAM, M.D., F.R.S., Honorary Physician to H. M. the Queen; Surgeon General; Coombe Lodge, Wimbledon Park. C. 1852-3. V.P. 1860-1. [illegible]. 1872. *Lib. Com.* 1849. *Trans.* 2.

1887 BALL, JAMES BARRY, M.D., 54, Wimpole street, Cavendish square.

1885 BALLANCE, CHARLES ALFRED, M.S., Senior Assistant Surgeon, West London Hospital; Assistant Surgeon, Hospital for Sick Children, Great Ormond street; Assistant Surgeon for Skin Diseases, St. Thomas's Hospital; 56, Harley street, Cavendish square. *Trans.* 1.

1848 †BALLARD, EDWARD, M.D., F.R.S., Inspector, Medical Department, Local Government Board; 12, Highbury terrace, Islington. C. 1872. V.P. 1875-6. *Sci. Com.* 1889. *Referee*, 1853-71. *Lib. Com.* 1855. *Trans.* 5.

Elected

1866 *BANKS, SIR JOHN THOMAS, M.D., K.C.B., Physician in Ordinary to the Queen in Ireland; Physician to Richmond, Whitworth, and Hardwicke Hospitals; Regius Professor of Physic in the University of Dublin; Member of the Senate of the Queen's University in Ireland; 45, Merrion square, Dublin.

1886 BANKS, WILLIAM MITCHELL, M.D., Surgeon to the Liverpool Royal Infirmary; 28, Rodney street, Liverpool.

1879 BARKER, ARTHUR EDWARD JAMES, Surgeon to University College Hospital, and Assistant Professor of Clinical Surgery and Teacher of Practical Surgery at University College, London; 87, Harley street, Cavendish square. *Trans.* 5.

1882 BARKER, FREDERICK CHARLES, M.D., Surgeon-Major, Bombay Medical Service [care of ARTHUR E. J. BARKER, 87, Harley street].

1833 †BARKER, THOMAS ALFRED, M.D., Consulting Physician to St. Thomas's Hospital; 109, Gloucester place, Portman square. C. 1844-5. V.P. 1853-4. T. 1860-2. *Referee*, 1848-51. *Trans.* 6.

1876 BARLOW, THOMAS, M.D., B.S., Physician to University College Hospital, to the Hospital for Sick Children, Great Ormond street, and to the London Fever Hospital; 10, Wimpole street, Cavendish square. *Trans.* 2.

1881 *BARNES, HENRY, M.D., F.R.S. Ed., Physician to the Cumberland Infirmary; 6, Portland square, Carlisle.

1861 BARNES, ROBERT, M.D., 15, Harley street, Cavendish square. C. 1877-8. V.P. 1889. *Referee*, 1867-76. *Lib. Com.* 1869-73. *Trans.* 4.

1864 BARRATT, JOSEPH GILLMAN, M.D.

1880 BARROW, A. BOYCE, Assistant Surgeon to King's College Hospital, to the Westminster Hospital, and to the West London Hospital; 17, Welbeck street, Cavendish square.

1840 BARROW, BENJAMIN, Surgeon to the Royal Isle of Wight Infirmary; Southlands, Ryde, Isle of Wight.

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1859 BARWELL, RICHARD, Consulting Surgeon to the Charing Cross Hospital; 55, Wimpole street. C. 1876-77. V.P. 1883-4. *Referee*, 1868-75, 1879-82. *Trans.* 11.

1868 BASTIAN, HENRY CHARLTON, M.A., M.D., F.R.S., Professor of Medicine in University College, London; Physician to University College Hospital and to the National Hospital for the Paralysed and Epileptic; 8A, Manchester square. *Referee*, 1886-8. C. 1885. *Trans.* 1.

1875 BEACH, FLETCHER, M.B., Medical Superintendent, Metropolitan District Asylum, Darenth, near Dartford, Kent.

1883 BEALE, EDWIN CLIFFORD, M.A., M.B., Assistant Physician to the City of London Hospital for Diseases of the Chest; and Physician to the Great Northern Hospital; 23, Upper Berkeley street.

1862 BEALE, LIONEL SMITH, M.B., F.R.S., Professor of the Principles and Practice of Medicine in King's College, London, and Physician to King's College Hospital; 61, Grosvenor street. C. 1876-77. *Referee*, 1873-5. *Trans.* 1.

1860 *BEALEY, ADAM, M.D., M.A., Oak Lea, Harrogate.

1856 BEARDSLEY, AMOS, F.L.S., Bay villa, Grange-over-Sands, Lancashire.

1871 BECK, MARCUS, M.S., Professor of Surgery in University College, London, and Surgeon to University College Hospital; 30, Wimpole street, Cavendish square. C. 1886-7. *Referee*, 1882-5. *Lib. Com.* 1881-5.

1880 BEEVOR, CHARLES EDWARD, M.D., Assistant Physician to the National Hospital for the Paralysed and Epileptic; 33, Harley street, Cavendish square. *Trans.* 1.

1871 BELLAMY, EDWARD, Senior Surgeon to, and Lecturer on Surgery at, Charing Cross Hospital; Lecturer on Artistic Anatomy to the Science and Art Department, South Kensington; Examiner in Surgery in the Victoria University, Manchester; 17, Wimpole street, Cavendish square. C. 1886. *Referee*, 1882-5. *Lib. Com.* 1879-81. *Trans.* 1.

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1847 BENNET, JAMES HENRY, M.D., Mentone, Alpes Maritimes, France.

1880 BENNETT, ALEX. HUGHES, M.D., Physician to the Westminster Hospital; 76, Wimpole street, Cavendish square. *Trans.* 1.

1883 BENNETT, STORER, Dental Surgeon to, and Lecturer on Dental Surgery at, the Middlesex Hospital; Dental Surgeon to the Dental Hospital of London; 17 George street, Hanover square.

1877 BENNETT, WILLIAM HENRY, Surgeon to, and Lecturer on Anatomy at, St. George's Hospital; 1, Chesterfield street, Mayfair. *Trans.* 3.

1845 †BERRY, EDWARD UNWIN, 17, Sherriff road, West Hampstead.

1885 BERRY, JAMES, Assistant Demonstrator of Anatomy, St. Bartholomew's Hospital; 60, Welbeck street, Cavendish square.

1820 BERTIN, STEPHEN, Paris.

1872 BEVERLEY, MICHAEL, M.D., Assistant Surgeon to the Norfolk and Norwich Hospital; 54, Prince of Wales road, Norwich.

1865 *BICKERSTETH, EDWARD ROBERT, Surgeon to the Liverpool Royal Infirmary, and Lecturer on Clinical Surgery in the Liverpool Royal Infirmary School of Medicine; 2, Rodney street, Liverpool. *Trans.* 1.

1878 BINDON, WILLIAM JOHN VEREKER, M.D., 48, St. Ann's street, Manchester.

1856 †BIRD, WILLIAM, Consulting Surgeon to the West London Hospital; Bute House, Hammersmith.

1849 †BIRKETT, EDMUND LLOYD, M.D., Consulting Physician to the City of London Hospital for Diseases of the Chest; 48, Russell square. C. 1865-6. *Referee*, 1851-9.

1851 †BIRKETT, JOHN, F.L.S., Consulting Surgeon to Guy's Hospital; Corresponding Member of the "Société de Chirurgie" of Paris; Inspector of Anatomy for the Provinces in England and Wales; 62, Green street, Grosvenor square. L. 1856-7. S. 1863-5. C. 1867-8. T. 1870-78. V.P. 1879-80. *Referee*, 1851-5, 1866 1869, *Sci. Com.* 1863. *Lib. Com.* 1852. *Trans.* 8.

Elected

1866 BISHOP, EDWARD, M.D.

1881 BISS, CECIL YATES, M.D., Assistant Physician to, and Lecturer on Materia Medica at, the Middlesex Hospital, and Assistant Physician to the Hospital for Consumption, Brompton; 135, Harley street, Cavendish square. *Trans.* 2.

1865 BLANCHET, HILARION, Examiner to the College of Physicians and Surgeons, Lower Canada; 6, Palace street, Quebec, Canada east.

1865 BLANDFORD, GEORGE FIELDING, M.D., Lecturer on Psychological Medicine at St. George's Hospital; 48, Wimpole street, Cavendish square. C. 1883-4.

1846 †BOSTOCK, JOHN ASHTON, C.B., *Treasurer;* Hon. Surgeon to H.M. the Queen; Deputy Surgeon-General; 73, Onslow gardens, Brompton. C. 1861-2. V.P. 1870-71. T. 1888-9. *Sci. Com.* 1867.

1869 BOURNE, WALTER, M.D. [care of the National Bank of India, 80, King William street, City]; Arcachon, France.

1882 BOWLBY, ANTHONY ALFRED, Surgical Registrar to St. Bartholomew's Hospital; 75, Warrington crescent, Maida hill. *Trans.* 2.

1870 *BOWLES, ROBERT LEAMON, M.D., 8, West terrace, Folkestone. *Trans.* 1.

1841 †BOWMAN, SIR WILLIAM, BART., LL.D., F.R.S., F.L.S., Consulting Surgeon to the Royal London Ophthalmic Hospital, Moorfields; 5, Clifford street, Bond street. C. 1852-3. V.P. 1862. *Referee*, 1845-50, 1854-6. *Lib. Com.* 1847. *Trans.* 3.

1886 BOXALL, ROBERT, M.D., Physician to the General Lying-in Hospital; 6, Chandos street, Cavendish square.

1884 BOYD, STANLEY, M.B., Assistant Surgeon to, and Demonstrator of Anatomy at, Charing Cross Hospital; 27, Gower street.

1862 BRACE, WILLIAM HENRY, M.D., 7, Queen's Gate terrace, Kensington.

Elected

1874 BRADSHAW, A. F., Surgeon-Major; Surgeon to the Rt. Hon. the Commander in Chief in India; Army Head Quarters, Bengal Presidency. [Agent: Vesey W. Holt, 17, Whitehall place.]

1883 BRADSHAW, JAMES DIXON, M.B., 30, George Street, Hanover square.

1867 *BRETT, ALFRED T., M.D., Watford, Herts.

1876 BRIDGES, ROBERT, M.B., Manor House, Yattendon, Newbury, Berks.

1867 BRIDGEWATER, THOMAS, M.B., Harrow-on-the-Hill, Middlesex.

1868 BROADBENT, WILLIAM HENRY, M.D., Physician to, and Lecturer on Clinical Medicine at, St. Mary's Hospital; Consulting Physician to the London Fever Hospital; 34, Seymour street, Portman square. C. 1885. *Referee*, 1881-4. *Trans.* 5.

1851 †BRODHURST, BERNARD EDWARD, F.L.S., Surgeon to the Royal Orthopædic Hospital; 20, Grosvenor street. C. 1868-9. *Lib. Com.* 1862-3. *Trans.* 2. *Pro.* 1.

1872 BRODIE, GEORGE BERNARD, M.D., Consulting Physician-Accoucheur to Queen Charlotte's Hospital; 3, Chesterfield street, Mayfair. *Trans.* 1.

1860 BROWN-SÉQUARD, CHARLES EDOUARD, M.D., LL.D., F.R.S., Laureate of the Academy of Sciences of Paris; Professor of Medicine at the College of France; Professor of General Physiology at the Museum of Natural History; Paris. *Sci. Com.* 1862.

1888 BROWNE, HENRY LANGLEY, Moor House, West Bromwich.

1878 BROWNE, SIR JAMES CRICHTON, M.D., LL.D., F.R.S., Lord Chancellor's Visitor in Lunacy; 7, Cumberland terrace, Regent's Park.

1880 BROWNE, JAMES WILLIAM, M.B., 7, Norland place, Holland Park.

1881 BROWNE, JOHN WALTON, M.D., Surgeon to the Belfast Ophthalmological Hospital; 10, College square N., Belfast.

Elected

1881 BROWNE, OSWALD AUCHINLECK, M.A., M.B., Casualty Physician to St. Bartholomew's Hospital and Physician to the Royal Hospital for Diseases of the Chest; 6A, Bedford square.

1874 BRUCE, JOHN MITCHELL, M.D., Physician to, and Lecturer on Materia Medica at, the Charing Cross Hospital; Assistant Physician to the Hospital for Consumption, Brompton; 70, Harley street. *Sci. Com.* 1889. *Referee*, 1886-8. *Lib. Com.* 1888. *Trans.* 1.

1871 BRUNTON, THOMAS LAUDER, M.D., F.R.S., Assistant Physician to, and Lecturer on Materia Medica and Therapeutics at, St. Bartholomew's Hospital; 10, Stratford place, Oxford street. C. 1888-9. *Referee*, 1880-87. *Lib. Com.* 1882-7.

1860 BRYANT, THOMAS, Consulting Surgeon to Guy's Hospital; Corresponding Member "Société de Chirurgie, Paris;" 65, Grosvenor street, Grosvenor square. C. 1873-4. V. P. 1885-6. *Sci. Com.* 1863. *Referee*, 1882-4. *Lib. Com.* 1868-71. *Trans.* 11. *Pro.* 1.

1864 BUCHANAN, GEORGE, M.D., F.R.S., Medical Officer of the Local Government Board; Member of the Senate of the University of London; 24, Nottingham place, Marylebone road.

1864 BUCKLE, FLEETWOOD, M.D.

1889 BULL, WILLIAM CHARLES, M.B., 35, Clarges street, Piccadilly.

1881 BULLER, AUDLEY CECIL, M.D.

1885 BUTLER-SMYTHE, ALBERT CHARLES, Senior Surgeon to the Grosvenor Hospital for Women and Children; 35, Brook street, Grosvenor square.

1873 BUTLIN, HENRY TRENTHAM, Assistant Surgeon to, and Demonstrator of Practical Surgery and of Diseases of the Larynx at, St. Bartholomew's Hospital; 82, Harley street, Cavendish square. C. 1887-8. *Trans.* 3.

1871 BUTT, WILLIAM F., 48, Park street, Park lane.

Elected

1883 BUXTON, DUDLEY WILMOT, M.D., B.S., Administrator, and Teacher of the Use, of Anæsthetics, in University College Hospital; Anæsthetist to the Hospital for Women, Soho Square, and to the London Dental Hospital; 82, Mortimer street, Cavendish square.

1868 BUZZARD, THOMAS, M.D., Physician to the National Hospital for the Paralysed and Epileptic; 74, Grosvenor street, Grosvenor square. C. 1885-6. *Referee.* 1887-8.

1851 *CADGE, WILLIAM, Surgeon to the Norfolk and Norwich Hospital; 49, St. Giles's street, Norwich. *Trans.* 1.

1885 CAHILL, JOHN, 12, Seville street, Lowndes square.

1887 CALVERT, JAMES, M.D., 86, Queen Anne street, Cavendish square.

1888 CARLESS, ALBERT, M.B., B.S., Assistant Surgeon to King's College Hospital; 15, Stratford place, Oxford street.

1875 CARTER, CHARLES HENRY, M.D., Physician to the Hospital for Women, Soho square; 45, Great Cumberland place, Hyde Park.

1853 CARTER, ROBERT BRUDENELL, Ophthalmic Surgeon to, and Lecturer on Ophthalmic Surgery at, St. George's Hospital; 27, Queen Anne street, Cavendish square. *Trans.* 1.

1888 CARTER, WILLIAM JEFFREYS BECHER.

1845 †CARTWRIGHT, SAMUEL, late Professor of Dental Surgery at King's College, London, and Surgeon-Dentist to King's College Hospital; Consulting Surgeon to the Dental Hospital; 32, Old Burlington street. C. 1860-1. *Sci. Com.* 1863.

1879 CARTWRIGHT, S. HAMILTON, late Professor of Dental Surgery at King's College, London, and Surgeon Dentist to King's College Hospital.

1888 CAUTLEY, EDMUND, M.B., B.C., 6, Pump court, Temple.

1868 CAVAFY, JOHN, M.D., Physician to St. George's Hospital; 2, Upper Berkeley street, Portman square. C. 1887. *Lib. Com.* 1888. *Trans.* 1.

Elected

1871 CAYLEY, WILLIAM, M.D., Physician to, and Lecturer on the Principles and Practice of Medicine at, the Middlesex Hospital; Physician to the London Fever Hospital and to the North-Eastern Hospital for Children; 27, Wimpole street, Cavendish square. C. 1888. *Referee*, 1886-7. *Lib. Com.* 1886-7. *Trans.* 2.

1884 CHAFFEY, WAYLAND CHARLES, M.B., Assistant Physician to the Royal Alexandra Hospital for Children; 8, North street, Brighton.

1879 CHAMPNEYS, FRANCIS HENRY, M.A., M.B., Obstetric Physician to, and Lecturer on Midwifery at, St. George's Hospital; 60, Great Cumberland place. *Lib. Com.* 1885-8. *Trans.* 7.

1859 CHANCE, FRANK, M.D., Burleigh House, Sydenham Hill.

1885 CHAPMAN, PAUL MORGAN, M.D., Physician to the Hereford General Infirmary, 1, St. John street, Hereford. *Trans.* 1.

1877 CHARLES, T. CRANSTOUN, M.D., Lecturer on Practical Physiology at St. Thomas's Hospital; Albert Mansions, 106, Victoria street, Westminster.

1881 *CHAVASSE, THOMAS FREDERICK, M.D., C.M., Surgeon to the Birmingham General Hospital; 24, Temple row, Birmingham. *Trans.* 2.

1868 CHEADLE, WALTER BUTLER, M.D., *Trustee;* Physician to, and Lecturer on Medicine at, St. Mary's Hospital; Senior Physician to the Hospital for Sick Children; 19, Portman street, Portman square. S. 1886-8. *Sci. Com.* 1889. *Referee*, 1885. *Trans.* 1.

1879 CHEYNE, WILLIAM WATSON, M.B., Assistant Surgeon to King's College Hospital, and Demonstrator of Surgery in King's College, London; 59, Welbeck street, Cavendish square. *Lib. Com.* 1886-8.

1873 *CHISHOLM, EDWIN, M.D., Abergeldie, Ashfield, near Sydney, New South Wales.

1865 CHOLMELEY, WILLIAM, M.D., Physician to the Great Northern Hospital; 63, Grosvenor street, Grosvenor square. C. 1881-2. *Referee*, 1873-80.

Elected

1872 CHRISTIE, THOMAS BEITH, M.D., C.I.E., Medical Superintendent, Royal India Asylum, Ealing.

1866 CHURCH, WILLIAM SELBY, M.D., Physician to, and Lecturer on Clinical Medicine at, St. Bartholomew's Hospital; 130, Harley street, Cavendish square. C. 1885-6. *Referee*, 1874-81.

1860 CLARK, SIR ANDREW, Bart., M.D., LL.D., F.R.S., *Trustee*, *Vice-President*, Physician to, and Emeritus Professor of Clinical Medicine at, the London Hospital; 16, Cavendish square. C. 1875. V.P. 1888.

1879 CLARK, ANDREW, Surgeon to, and Lecturer on Practical Surgery at, the Middlesex Hospital; 71, Harley street, Cavendish square.

1839 †CLARK, FREDERICK LE GROS, F.R.S., Consulting Surgeon to St. Thomas's Hospital; The Thorns, Sevenoaks. S. 1847-9. V.P. 1855-6. *Referee*, 1859-81. *Lib. Com.* 1847. *Trans.* 5.

1882 CLARKE, ERNEST, M.D., B.S., Surgeon to the Miller Hospital, and Senior Assistant Surgeon to the Central London Ophthalmic Hospital; 21, Lee terrace, Blackheath.

1848 †CLARKE, JOHN, M.D., 42, Hertford street, May Fair. C. 1866.

1888 CLARKE, ROBERT HENRY, M.B., Clarence Lodge, Redhill, Surrey.

1881 CLARKE, W. BRUCE, M.B., Assistant Surgeon to, and Lecturer on Anatomy at, St. Bartholomew's Hospital; 46, Harley street, Cavendish square.

1842 †CLAYTON, SIR OSCAR MOORE PASSEY, C.M.G., Extra Surgeon-in-Ordinary to H.R.H. the Prince of Wales, and Surgeon-in-Ordinary to H.R.H. the Duke of Edinburgh; 5, Harley street, Cavendish square. C. 1865.

1879 †CLUTTON, HENRY HUGH, M.A., M.B., Assistant Surgeon to, and Lecturer on Forensic Medicine at, St. Thomas's Hospital; 2, Portland place.

Elected

1857 COATES, CHARLES, M.D., Consulting Physician to the Bath General and Royal United Hospitals; 10, Circus, Bath.

1888 COCK, FREDERICK WILLIAM, M.D., 1, Porchester Houses, Porchester Square.

1868 COCKLE, JOHN, M.D., F.L.S., Consulting Physician to the Royal Free Hospital; 8, Suffolk street, Pall Mall. *Trans.* 2.

1885 COLLINS, WILLIAM MAUNSELL, M.D., 10, Cadogan place.

1865 COOPER, ALFRED, Consulting Surgeon to the West London Hospital; Surgeon to the Lock Hospital and to St. Mark's Hospital; 9, Henrietta street, Cavendish square.

1868 CORNISH, WILLIAM ROBERT, C.I.E., late Surgeon-General, Madras Army; Hon. Physician to H.M the Queen; 8, Cresswell gardens, Kensington.

1860 *CORRY, THOMAS CHARLES STEUART, M.D., Ormean Terrace, Belfast.

1860 †COUPER, JOHN, Surgeon to the Royal London Ophthalmic Hospital; 80, Grosvenor street. C. 1876. *Referee*, 1882-3.

1877 COUPLAND, SIDNEY, M.D., Physician to, and Lecturer on Practical Medicine at, the Middlesex Hospital; 16, Queen Anne street, Cavendish square.

1862 †COWELL, GEORGE, Surgeon to, and Lecturer on Surgery at, the Westminster Hospital; Surgeon to the Royal Westminster Ophthalmic Hospital; Surgeon to the Victoria Hospital for Children; 3, Cavendish place, Cavendish square. C. 1882-3.

1841 CRAWFORD, MERVYN ARCHDALL NOTT, M.D., Millwood, Wilbury road, Brighton. C. 1853-4.

1868 CRAWFORD, SIR THOMAS, K.C.B., M.D., Hon. Surgeon to H.M. the Queen; late Director General, Army Medical Department; 5, St. John's Park, Blackheath. C. 1887.

1869 *CRESSWELL, PEARSON R., Dowlais, Merthyr Tydvil.

1874 CRIPPS, WILLIAM HARRISON, Assistant Surgeon to St. Bartholomew's Hospital; 2, Stratford place, Oxford street. *Trans.* 1.

Elected

1882 CROCKER, HENRY RADCLIFFE, M.D., Physician to the Skin Department, University College Hospital; Physician to the East London Hospital for Children; 121, Harley street, Cavendish square. *Trans.* 3.

1868 CROFT, JOHN, Surgeon to, and Lecturer on Clinical Surgery at, St. Thomas's Hospital; 48, Brook street, Grosvenor square. C. 1884. *Referee*, 1885-88. *Lib. Com.* 1877-8. *Trans.* 2.

1862 CROMPTON, SAMUEL, M.D., Brookmead, Cranleigh, Surrey.

1837 CROOKES, JOHN FARRAR, 45, Augusta gardens, Folkestone.

1872 CROSSE, THOMAS WILLIAM, Surgeon to the Norfolk and Norwich Hospital; 22, St. Giles's street, Norwich.

1888 CULLINGWORTH, CHARLES JAMES, M.D., Obstetric Physician and Lecturer on Midwifery at St. Thomas's Hospital; 46, Brook street, Grosvenor square.

1879 CUMBERBATCH, A. ELKIN, Aural Surgeon to St. Bartholomew's Hospital, and to the Great Northern Hospital; 17, Queen Anne street, Cavendish square.

1889 CUMBERBATCH, LAWRENCE TRENT, M.D., 25, Cadogan place (*deceased*).

1873 CURNOW, JOHN, M.D., Professor of Anatomy in King's College, London, and Physician to King's College Hospital; 3, George street, Hanover square. *Referee*, 1884-8.

1886 DAKIN, WILLIAM RADFORD, M.D., 57, Welbeck street, Cavendish square.

1872 DALBY, SIR WILLIAM BARTLETT, M.B., Aural Surgeon to, and Lecturer on Aural Surgery at, St. George's Hospital; 18, Savile row. *Trans.* 3.

1884 DALLAWAY, DENNIS, 5, Duchess street, Portland place.

1877 DARBISHIRE, SAMUEL DUKINFIELD, M.D., Physician to the Radcliffe Infirmary, Oxford; Beaumont street, Oxford.

1879 DARWIN, FRANCIS, M.B., F.R.S., The Grove, Huntingdon road, Cambridge.

1874 DAVIDSON, ALEXANDER, M.D., Physician to the Liverpool Northern Hospital; 2, Gambier terrace, Liverpool.

Elected

1853 DAVIES, ROBERT COKER NASH, Rye, Sussex.

1852 DAVIES, WILLIAM, M.D., 2, Marlborough buildings, Bath.

1876 DAVIES-COLLEY, J. NEVILLE C., M.C., Surgeon to, and Lecturer on Anatomy at, Guy's Hospital; 36, Harley street, Cavendish square. *Trans.* 2.

1878 DAVY, RICHARD, F.R.S. Ed., Surgeon to, and Lecturer on Surgery at, the Westminster Hospital; 33, Welbeck street, Cavendish square. *Trans.* 1.

1882 *DAWSON, YELVERTON, M.D., Heathlands, Southbourne-on-Sea, Hants.

1867 DAY, WILLIAM HENRY, M.D., Physician to the Samaritan Free Hospital for Women and Children; 10, Manchester square.

1878 DENT, CLINTON THOMAS, Assistant Surgeon to, and Lecturer on Practical Surgery at, St. George's Hospital; 61, Brook street. *Trans.* 2.

1859 †DICKINSON, WILLIAM HOWSHIP, M.D., Physician to, and Lecturer on Medicine at, St. George's Hospital, and Consulting Physician to the Hospital for Sick Children; Honorary Fellow of Caius College, Cambridge; 9, Chesterfield street, Mayfair. C. 1874-5. V.P. 1887. *Referee*, 1869-73, 1882-6. *Sci. Com.* 1867-79, 1889. *Trans.* 13.

1839 †DIXON, JAMES, Consulting Surgeon to the Royal London Ophthalmic Hospital, Moorfields; Harrow Lands, Dorking. L. 1849-55. V.P. 1857-8. T. 1863-4. C. 1866-7. *Referee*, 1865. *Lib. Com.* 1845-8. *Trans.* 4.

1889 DODD, HENRY WORK, 47, Kensington Park gardens.

1845 DODD, JOHN.

1888 DONELAN, JAMES, M.B., M.C., 2, Upper Wimpole street.

1879 DONKIN, HORATIO, M.B., Physician to the Westminster Hospital; Physician to the East London Hospital for Children; 108, Harley street, Cavendish square.

Elected

1877 DORAN, ALBAN HENRY GRIFFITHS, Surgeon to the Samaritan Free Hospital; 9, Granville place, Portman square. *Trans.* 1.

1863 DOWN, JOHN LANGDON HAYDON, M.D., Physician to, and Lecturer on Clinical Medicine at, the London Hospital; 81, Harley street, Cavendish square. C. 1880. *Trans.* 2.

1867 DRAGE, CHARLES, M.D., Hatfield, Herts.

1884 DRAGE, LOVELL, M.B., B.S., The Small House, Hatfield, Herts.

1879 DREWITT, F. G. DAWTREY, M.D., Physician to the West London Hospital and to the Victoria Hospital for Children; 52, Brook street, Grosvenor square.

1885 DRUMMOND, DAVID, M.D., 7, Saville Place, Newcastle-on-Tyne.

1880 DRURY, CHARLES DENNIS HILL, M.D., Bondgate, Darlington.

1865 DRYSDALE, CHARLES ROBERT, M.D., Physician to the Farringdon Dispensary; Assistant-Physician to the Metropolitan Free Hospital; 23, Sackville street, Piccadilly.

1865 †DUCKWORTH, SIR DYCE, M.D., Physician to, and Lecturer on Clinical Medicine at, St. Bartholomew's Hospital; 11, Grafton street, Bond street. C. 1883-4. *Referee* 1885-8. *Trans.* 2.

1876 DUDLEY, WILLIAM LEWIS, M.D., Physician to the City Dispensary; 149, Cromwell road, South Kensington.

1874 DUFFIN, ALFRED BAYNARD, M.D., Professor of Pathological Anatomy in King's College, London, and Physician to King's College Hospital; 18, Devonshire street, Portland place.

1871 DUKE, BENJAMIN, Windmill House, Clapham Common.

1871 *DUKES, CLEMENT, M.D., B.S., Physician to Rugby School, and Senior Physician to the Hospital of St. Cross, Rugby; Sunnyside, Rugby, Warwickshire.

1867 DUKES, M. CHARLES, M.D., Wellesley Villa, Wellesley road, Croydon.

Elected

1880 DUNBAR, JAMES JOHN MACWHIRTER, M.D., Hedingham House, Clapham Common.

1877 DUNCAN, JAMES MATTHEWS, M.D., LL.D., F.R.S., Obstetric Physician to, and Lecturer on Midwifery and Diseases of Women at, St. Bartholomew's Hospital; 71, Brook street, Grosvenor square. *Referee*, 1881-8. *Trans.* 1.

1889 *DUNCAN, JOHN, M.D., St. Petersburg, Russia.

1884 DUNCAN, WILLIAM, M.D., Obstetric Physician to, and Lecturer on Midwifery at, the Middlesex Hospital; 6, Harley street, Cavendish square.

1887 DUNN, HUGH PERCY, Assistant Ophthalmic Surgeon and Pathologist at the West London Hospital; 11, Nottingham place.

1863 DURHAM, ARTHUR EDWARD, F.L.S., Surgeon to, and Lecturer on Surgery at, Guy's Hospital; 82, Brook street, Grosvenor square. C. 1876-7. V. P. 1887. *Referee*, 1880-1. *Sci. Com.* 1867. *Lib. Com.* 1872-5. *Trans.* 5.

1874 DURHAM, FREDERIC, M.B., 82, Brook street, Grosvenor square.

1843 DURRANT, CHRISTOPHER MERCER, M.D., Consulting Physician to the East Suffolk and Ipswich Hospital; Northgate street, Ipswich, Suffolk.

1872 EAGER, REGINALD, M.D., Northwoods, near Bristol.

1887 EASMON, JOHN FARRELL, M.D., Assistant Colonial Surgeon, Gold Coast Colony, and Acting Chief Medical Officer of the Colony; Accra, Gold Coast, West Africa.

1868 EASTES, GEORGE, M.B.Lond., 35, Gloucester place, Hyde Park.

1888 ECCLES, ARTHUR SYMONS, M.B., C.M., 34, Leinster square.

1883 EDMUNDS, WALTER, M.C., 75, Lambeth Palace road, Albert Embankment. *Trans.* 2.

1883 EDWARDES, EDWARD JOSHUA, M.D., 16, Acacia road, St. John's Wood.

Elected

1884 EDWARDS, FREDERICK SWINFORD, Surgeon to the West London Hospital, and to St. Peter's Hospital for Stone; 93, Wimpole street, Cavendish square.

1824 EDWARDS, GEORGE.

1887 ELLIOTT, JOHN.

1848 ELLIS, GEORGE VINER, late Professor of Anatomy in University College, London; Minsterworth, Gloucester. C. 1863-4. *Trans.* 2.

1868 ELLIS, JAMES, M.D., the Sanatorium, Anaheim, Los Angeles County, California.

1854 *ELLISON, JAMES, M.D., Surgeon-in-Ordinary to the Royal Household, Windsor; 14, High street, Windsor.

1842 †ERICHSEN, JOHN ERIC, LL.D.,F.R.S., Surgeon Extraordinary to H.M. the Queen; Emeritus Professor of Surgery in University College, London, and Consulting Surgeon to University College Hospital; 6, Cavendish place, Cavendish sq. C.1855-6. V.P.1868. P.1879-80. *Referee*, 1866-8, 1884-7. *Lib. Com.* 1844-7, 1854. *Trans.* 2.

1879 EVE, FREDERIC S., Pathological Curator of the Museum, Royal College of Surgeons; Assistant Surgeon to the London Hospital; 125, Harley street, Cavendish square. *Trans.* 2.

1877 EWART, WILLIAM, M.D., Physician to St. George's Hospital; 33, Curzon street, Mayfair. *Sci. Com.* 1889. *Trans.* 1.

1875 *FAGAN, JOHN, Surgeon to, and Lecturer on Clinical Surgery at, the Belfast Royal Hospital; 1, Glengall place, Belfast.

1869 FAIRBANK, FREDERICK ROYSTON, M.D., 46, Hallgate, Doncaster.

1862 FARQUHARSON, ROBERT, M.D., LL.D., M.P., Migvie Lodge, Porchester gardens, Hyde park; Finzean, Aboyne, Aberdeenshire, and the Reform Club, Pall Mall. *Lib. Com.* 1876-80.

Elected

1872 FAYRER, SIR JOSEPH, K.C.S.I., M.D., F.R.S., Honorary Physician to H.M. the Queen, and to H.R.H. the Prince of Wales, and Physician to H.R.H. the Duke of Edinburgh; late Surgeon-General Bengal Medical Service; Examining Medical Officer to the Secretary of State for India in Council; President of the Indian Medical Board; 53, Wimpole street, Cavendish square. C. 1888. *Referee*, 1881-7.

1887 FEENY, MICHAEL HENRY, Les Avants, Montreux, Switzerland.

1872 *FENWICK, JOHN C. J., M.D., Physician to the Durham County Hospital; 25, North road, Durham.

1863 FENWICK, SAMUEL, M.D., Physician to the London Hospital; 29, Harley street, Cavendish square. C. 1880. *Referee*, 1882-8. *Trans.* 4.

1880 FERRIER, DAVID, M.D., LL.D., F.R.S., Professor of Forensic Medicine in King's College, London, and Physician to King's College Hospital; Physician for Out-patients to the National Hospital for the Paralysed and Epileptic; 34, Cavendish square. *Trans.* 2.

1852 *FIELD, ALFRED GEORGE.

1889 FIELD, GEORGE P., Aural Surgeon to, and Lecturer on Aural Surgery at, St. Mary's Hospital; 34, Wimpole street, Cavendish square.

1849 †FINCHAM, GEORGE TUPMAN, M.D., Consulting Physician to the Westminster Hospital; 13, Belgrave road, Pimlico. C. 1871.

1879 FINLAY, DAVID WHITE, M.D., Physician to, and Lecturer on Forensic Medicine at, the Middlesex Hospital; Physician to the Royal Hospital for Diseases of the Chest; 9, Lower Berkeley street, Portman square. *Trans.* 2.

1866 FITZ-PATRICK, THOMAS, A.M., M.D., 30, Sussex gardens, Hyde Park.

1842 FLETCHER, THOMAS BELL ELCOCK, M.D., Consulting Physician to the Birmingham General Hospital; 8, Clarendon crescent, Leamington. *Trans.* 1.

Elected

1864 *FOLKER, WILLIAM HENRY, Surgeon to the North Staffordshire Infirmary; Bedford House, Hanley, Staffordshire.

1877 DE FONMARTIN, HENRY, M.D., 1, Anchor Gate terrace, Portsea, Hants.

1848 †FORBES, JOHN GREGORY, Ellerslie, Widmore road, Bromley, Kent. C. 1868-9. *Lib. Com.* 1855. *Trans.* 2.

1865 FOSTER, SIR BALTHAZAR WALTER, M.D., M.P., Professor of Medicine at the Queen's College, Birmingham, and Physician to the Birmingham General Hospital; 14, Temple row, Birmingham.

1883 FOWLER, JAMES KINGSTON, M.A., M.D., Assistant Physician to, and Lecturer on Pathological Anatomy at, the Middlesex Hospital, and Assistant Physician to the Hospital for Consumption, Brompton; 35, Clarges street, Piccadilly.

1859 FOX, EDWARD LONG, M.D., Consulting Physician to the Bristol Royal Infirmary; Church House, Clifton, Gloucestershire.

1887 FOX, RICHARD HINGSTON, M.D., 23, Finsbury square.

1880 FOX, THOMAS COLCOTT, B.A., M.B., Physician to the Skin Department of the Paddington Green Hospital for Children, and Assistant Physician to the Victoria Hospital for Children; 14, Harley street, Cavendish square. *Trans.* 1.

1871 FRANK, PHILIP, M.D., Cannes, France.

1884 *FRANKS, KENDAL, M.D., Surgeon to the Adelaide Hospital and to the Throat and Ear Hospital, Dublin; 69, Fitzwilliam square, Dublin. *Trans.* 1.

1843 FRASER, PATRICK, M.D., C. 1866.

1868 FREEMAN, WILLIAM HENRY, 21, St. George's square, South Belgravia.

1884 FULLER, CHARLES CHINNER, 10, St. Andrew's place, Regent's Park.

1883 FULLER, HENRY ROXBURGH, M.D., 45, Curzon street, May Fair.

1876 FURNER, WILLOUGHBY, Assistant Surgeon to the Sussex County Hospital; 2, Brunswick place, Brighton.

Elected

1864 *GAIRDNER, WILLIAM TENNANT, M.D., LL.D., Physician in Ordinary to H.M. the Queen in Scotland; Professor of the Practice of Medicine in the University of Glasgow; Physician to the Western Infirmary, Glasgow; 225, St. Vincent street, Glasgow. *Trans.* 1.

1874 GALABIN, ALFRED LEWIS, M.A., M.D., Obstetric Physician to, and Lecturer on Midwifery and the Diseases of Women at, Guy's Hospital; 49, Wimpole st., Cavendish square. *Referee*, 1882-8. *Lib. Com.* 1883-4. *Trans.* 2.

1883 GALTON, JOHN CHARLES, M.A., F.L.S., 45, Great Marlborough street.

1885 GAMGEE, ARTHUR, M.D., F.R.S.

1865 GANT, FREDERICK JAMES, Senior Surgeon to the Royal Free Hospital; 16, Connaught square, Hyde Park. C. 1880-81. *Referee*, 1886-8. *Lib. Com.* 1882-5. *Trans.* 3.

1867 GARLAND, EDWARD CHARLES, Yeovil, Somerset.

1867 GARLIKE, THOMAS W., Malvern Cottage, Churchfield road, Ealing.

1854 †GARROD, SIR ALFRED BARING, M.D., F.R.S., Consulting Physician to King's College Hospital; 10, Harley street Cavendish square. C. 1867. V.P. 1880-81. *Referee*, 1855-65. *Trans.* 8.

1886 GARROD, ARCHIBALD EDWARD, M.A., M.D., Casualty Physician to St. Bartholomew's Hospital, and Physician to the Marylebone Dispensary; 9, Chandos street, Cavendish square. *Sci. Com.* 1889. *Trans.* 3.

1879 GARSTANG, THOMAS WALTER HARROPP, Headingley House, Knutsford, Cheshire.

1889 GASKELL, WALTER HOLBROOK, M.D., F.R.S., Lecturer on Physiology, University of Cambridge; Petersfield House, Parkside, Cambridge.

1819 GAULTER, HENRY.

1887 GAY, JOHN, 119, Upper Richmond road, Putney.

Elected

1866 GEE, SAMUEL JONES, M.D., *Librarian*, Physician to, and Lecturer on Medicine at, St. Bartholomew's Hospital; Consulting Physician to the Hospital for Sick Children; 31, Upper Brook street, Grosvenor square. C. 1883-4. L. (June) 1887-9. *Sci. Com.* 1879. *Referee*, 1885-7. *Lib. Com.* 1871-6. *Trans.* 1.

1885 GELL, HENRY WILLINGHAM, M.B., 43, Albion street, Hyde Park.

1878 GERVIS, HENRY, M.D., Consulting Obstetric Physician to St. Thomas's Hospital; Consulting Physician to the Royal Maternity Charity; 40, Harley street, Cavendish square. *Referee*, 1884-8. *Trans.* 1.

1884 GIBBES, HENEAGE, M.D., Professor of Pathology in the University of Michigan; Ann Arbor, Michigan, U.S.A.

1880 GIBBONS, ROBERT ALEXANDER, M.D., Physician to the Grosvenor Hospital for Women and Children; 29, Cadogan place.

1877 GODLEE, RICKMAN JOHN, Surgeon to University College Hospital, and Teacher of Operative Surgery in University College, London; Surgeon to the North-Eastern Hospital for Children, and to the Hospital for Consumption, Brompton; 81, Wimpole street, Cavendish square. *Referee*, 1886-8. *Trans.* 5.

1870 GODSON, CLEMENT, M.D., Assistant-Physician-Accoucheur to St. Bartholomew's Hospital; Consulting Physician to the City of London Lying-in Hospital; 9, Grosvenor street, Grosvenor square.

1886 GOLDING-BIRD, CUTHBERT HILTON, M.B., Assistant Surgeon and Lecturer on Physiology at Guy's Hospital; 13, St. Thomas street, Southwark.

1851 GOODFELLOW, STEPHEN JENNINGS, M.D., Consulting Physician to the Middlesex Hospital; Swinnerton Lodge, near Dartmouth, Devon. C. 1864-5. *Referee*, 1860-3. *Lib. Com.* 1863. *Trans.* 2.

Elected

1883 GOODHART, JAMES FREDERIC, M.D., Physician to, and Lecturer on Pathology at, Guy's Hospital; Physician to the Evelina Hospital for Sick Children; 25, Weymouth street, Portland place.

1889 GOODSALL, DAVID HENRY, 17, Devonshire place, Upper Wimpole street.

1877 GOULD, ALFRED PEARCE, M.S., Assistant Surgeon to the Middlesex Hospital; 10, Queen Anne street, Cavendish square. *Trans.* 2.

1873 GOWERS, WILLIAM RICHARD, M.D., F.R.S., Consulting Physician to University College Hospital; Physician to the National Hospital for the Paralysed and Epileptic; 50, Queen Anne street, Cavendish square. *Referee* 1888. *Lib. Com.* 1884-6. *Trans.* 7.

1851 †GOWLLAND, PETER YEAMES, Surgeon to St. Mark's Hospital; Surgeon-Major Hon. Artillery Company; 34, Finsbury square.

1868 GREEN, T. HENRY, M.D., Physician to Charing Cross Hospital, and to the Hospital for Consumption, Brompton; 74, Wimpole street, Cavendish square. C. 1886. *Referee*, 1882-5.

1875 *GREENFIELD, WILLIAM SMITH, M.D., Professor of General Pathology in the University of Edinburgh; 7, Heriot row, Edinburgh. *Sci. Com.* 1879. *Referee*, 1881.

1882 GRESSWELL, DAN ASTLEY, M.B., 5, Oakley square, Hampstead road.

1885 GRIFFITH, WALTER SPENCER ANDERSON, M.B., Physician to the Samaritan Free Hospital for Women and Children; 114, Harley street, Cavendish square.

1889 GRIFFITHS, JOSEPH, M.B., C.M., 16, Panton street, Cambridge.

1868 GRIGG, WILLIAM CHAPMAN, M.D., Assistant Obstetric Physician to the Westminster Hospital; Physician to the In-Patients, Queen Charlotte's Lying-in-Hospital; 27, Curzon street, Mayfair.

1852 GROVE, JOHN, Fyning, 15, Johnstown street, Bath.

Elected

1860 GUENEAU DE MUSSY, HENRI, M.D.; 15, Rue du Cirque, Paris. *Lib. Com.* 1863-5.

1849 †GULL, SIR WILLIAM WITHEY, Bart., M.D., D.C.L., LL.D., F.R.S., Physician-Extraordinary to H.M. the Queen; and Physician in Ordinary to H.R.H. the Prince of Wales; Consulting Physician to Guy's Hospital; 74, Brook street, Grosvenor square. C. 1864. V.P. 1874. *Referee*, 1855-63. *Trans.* 4.

1885 GULLIVER, GEORGE, M.B., Assistant Physician to, and Lecturer on Comparative Anatomy at, St. Thomas's Hospital; 16, Welbeck street.

1883 GUNN, ROBERT MARCUS, M.B., Assistant Surgeon to the Royal London Ophthalmic Hospital, Moorfields; Ophthalmic Surgeon to the Hospital for Sick Children, Great Ormond Street; 54, Queen Anne street, Cavendish square.

1886 HABERSHON, SAMUEL HERBERT, M.D., Casualty Physician to St. Bartholomew's Hospital; 70, Brook street, Grosvenor square.

1888 HADDEN, WALTER BAUGH, M.D., Assistant Physician and Demonstrator of Morbid Anatomy at St. Thomas's Hospital; Assistant Physician, Hospital for Sick Children; 21, Welbeck street, Cavendish square.

1885 HAIG, ALEXANDER, M.D., Casualty Physician to St. Bartholomew's Hospital; 30, Welbeck street, Cavendish square. *Trans.* 4.

1881 HALL, FRANCIS DE HAVILLAND, M.D., Assistant Physician, and Physician to the Throat Department, and Lecturer on Forensic Medicine at the Westminster Hospital; Physician to St. Mark's Hospital; 47, Wimpole street, Cavendish square.

1885 HALLIBURTON, WILLIAM DOBINSON, M.D., Assistant Professor of Physiology, University College, London; 25, Maitland Park Villas, Haverstock Hill.

1870 HAMILTON, ROBERT, Surgeon to the Royal Southern Hospital, Liverpool; 1 Prince's road, Liverpool.

Elected

1889 HANDFIELD-JONES, MONTAGU, M.D., 24, Montagu square.

1874 HARDIE, GORDON KENMURE, M.D., Deputy Inspector General of Hospitals; Florence road, Ealing, and Duff House, Banff, N.B.

1856 †HARE, CHARLES JOHN, M.D., *Treasurer*, late Professor of Clinical Medicine in University College, London, and Consulting Physician to University College Hospital; Berkeley House, 15, Manchester square. C. 1873-4. T. 1887-9.

1857 HARLEY, GEORGE, M.D., F.R.S. 25, Harley street, Cavendish square. C. 1871-2. *Referee*, 1865-70, 1873-6. *Sci. Com.* 1862-3. *Trans.* 1.

1864 HARLEY, JOHN, M.D., F.L.S., Physician to, and Lecturer on General Anatomy and Physiology at, St. Thomas's Hospital; 9, Stratford place, Oxford street. S. 1875-7. C. 1879-80. *Referee*, 1871-4, 1882-8. *Sci. Com.* 1879. *Trans.* 10.

1880 HARRIS, VINCENT DORMER, M.D., Physician to the Victoria Park Hospital; Demonstrator of Physiology at St. Bartholomew's Hospital; 31, Wimpole street, Cavendish square.

1870 HARRISON, REGINALD, 6, Lower Berkeley Street, Portman Square. *Trans.* 1.

1854 HAVILAND, ALFRED.

1870 HAWARD, J. WARRINGTON, *Secretary;* Surgeon to, and Lecturer on Clinical Surgery at, St. George's Hospital; 16, Savile row, Burlington Gardens. C. 1885. S. 1888-9. *Lib. Com.* 1881-4. *Trans.* 2.

1838 †HAWKINS, CHARLES, Inspector of Anatomical Schools in London; 9, Duke street, Portland place. C. 1846-7. S. 1850. V.P. 1858. T. 1861-2. *Referee*, 1859-60. *Lib. Com.* 1843. *Trans.* 2.

1885 HAWKINS, FRANCIS HENRY, M.B., Physician to St. George's and St. James's Dispensary and to the North London Hospital for Consumption; 59, Wimpole street, Cavendish square.

Elected

1848 †Hawksley, Thomas, M.D., 11, Albert Mansions, Victoria street, and Beomands, Chertsey, Surrey.

1875 Hayes, Thomas Crawford, M.D., Physician-Accoucheur and Physician for Diseases of Women and Children to King's College Hospital; 17, Clarges street, Piccadilly.

1860 Hayward, Henry Howard, Surgeon Dentist to, and Lecturer on Dental Surgery at, St. Mary's Hospital; 38, Harley street, Cavendish square. C. 1878-9.

1861 Hayward, William Henry.

1848 Heale, James Newton, M.D.

1865 Heath, Christopher, *Trustee*, Holme Professor of Clinical Surgery in University College, London; and Surgeon to University College Hospital; 36, Cavendish square. C. 1880. V.P. 1889. *Lib. Com.* 1870-3. *Trans.* 3.

1850 Heaton, George, M.D., Boston, U.S.

1882 Hensley, Philip John., M.D., Assistant Physician and Lecturer on Forensic Medicine to St. Bartholomew's Hospital; 4, Henrietta street, Cavendish square.

1877 Herman, George Ernest, M.B., Obstetric Physician to, and Lecturer on Midwifery at, the London Hospital; 20, Harley street, Cavendish square. *Trans.* 1.

1877 Heron, George Allan, M.D., Physician to the City of London Hospital for Diseases of the Chest, Victoria Park; 57, Harley street, Cavendish square.

1883 Herringham, Wilmot Parker, M.D., 13, Upper Wimpole street, Cavendish square. *Trans.* 1.

1843 Hewett, Sir Prescott Gardner, Bart., F.R.S., Serjeant-Surgeon to H.M. the Queen; Surgeon in Ordinary to H.R.H. the Prince of Wales; Consulting Surgeon to St. George's Hospital; Foreign Associate of the "Académie de Médecine," and Corresponding Member of the "Société de Chirurgie," Paris; Chesnut Lodge, Horsham, Sussex. C. 1859. V.P. 1866-7. *Referee*, 1850-8, 1860-5, 1868-83. *Sci. Com.* 1863. *Lib. Com.* 1846-7. *Trans.* 7.

Elected

1887 HEWITT, FREDERIC WILLIAM, M.D., 10, George street, Hanover square.

1855 †HEWITT, W. M. GRAILY, M.D., Emeritus Professor of Midwifery in University College, London, and Consulting Obstetric Physician to University College Hospital; 36, Berkeley square. C. 1876. *Referee*, 1868-75, 1877-88. *Lib. Com.* 1868, 1874.

1880 HICKS, CHARLES CYRIL, M.D., Wokingham, Berks.

1873 HIGGENS, CHARLES, Assistant Ophthalmic Surgeon to, and Lecturer on Ophthalmic Surgery at, Guy's Hospital; 38, Brook street, Grosvenor square. *Trans.* 2.

1862 HILL, M. BERKELEY, M.B., Professor of Clinical Surgery in University College, London, and Surgeon to University College Hospital; Surgeon to the Lock Hospital; 66, Wimpole street, Cavendish square. *Referee*, 1888. C. 1878-9. S. 1881-4. V.P. 1885-6. *Trans.* 1.

1861 *HOFFMEISTER, SIR WILLIAM CARTER, M.D., Surgeon to H.M. the Queen in the Isle of Wight; Clifton House, Cowes, Isle of Wight.

1843 †HOLDEN, LUTHER, Consulting Surgeon to St. Bartholomew's Hospital, to the Metropolitan Dispensary, and to the Foundling Hospital; Pinetoft, Ipswich. C. 1859. L. 1865. V.P. 1874. *Referee*, 1866-7. *Lib. Com.* 1858.

1879 HOLLAND, PHILIP ALEXANDER, M.A.

1868 HOLLIS, WILLIAM AINSLIE, M.A., M.D., Assistant-Physician to the Sussex County Hospital; 8, Cambridge road, Brighton.

1861 HOLMAN, WILLIAM HENRY, M.B., 68, Adelaide road, South Hampstead.

1856 †HOLMES, TIMOTHY, M.A., Consulting Surgeon to St. George's Hospital; Corresponding Member of the "Société de Chirurgie," Paris; 18, Great Cumberland place, Hyde Park. C. 1869-70. L. 1873-7. S. 1878-80. V.P. 1881-2. T. 1885-7. *Referee*, 1866-8, 1872, 1883-4. *Sci. Com.* 1867. *Lib. Com.* 1863-5. *Trans.* 8.

Elected

1846 †HOLT, BARNARD WIGHT, Consulting Surgeon to the Westminster Hospital; Medical Officer of Health for Westminster, 14, Savile row, Burlington Gardens. C. 1862-3. V.P. 1879-80.

1846 †HOLTHOUSE, CARSTEN, 5, Bloomsbury square. C. 1863. *Referee* 1870-6. *Lib. Com.* 1859-60.

1878 HOOD, DONALD WILLIAM CHARLES, M.D., Senior Physician to the North-West London Hospital; Physician to the West London Hospital; 43, Green street, Park lane.

1883 HORSLEY, VICTOR ALEXANDER HADEN, F.R.S., Assistant Surgeon to University College Hospital, Surgeon to the National Hospital for the Paralysed and Epileptic; Professor of Pathology in University College, London; Superintendent of the Brown Institution, Wandsworth road; 80, Park street, Grosvenor Square. *Trans.* 1.

1865 HOWARD, BENJAMIN, M.D. [New York, U.S.] *Trans.* 1.

1881 HOWARD, HENRY, M.B., abroad. [6, The Terrace, Mount Pleasant, Cambridge.]

1874 HOWSE, HENRY GREENWAY, M.S., Surgeon to, and Lecturer on Anatomy at, Guy's Hospital; Surgeon to the Evelina Hospital for Sick Children; 59, Brook street, Grosvenor square. *Sci.Com.* 1879. *Referee*, 1887-8. *Trans.* 2.

1886 HUDSON, CHARLES LEOPOLD, Pathologist and Curator of the Museum, Middlesex Hospital; Warden, Medical College, Cleveland street.

1884 HUGGARD, WILLIAM R., M.D. [Place de la Synagogue, 2, Genève.]

1857 †HULKE, JOHN WHITAKER, F.R.S., *Librarian*, Surgeon to the Middlesex Hospital; Surgeon to the Royal London Ophthalmic Hospital, Moorfields; 10, Old Burlington street. C. 1871-2. S. 1876-7. L. 1879-89. *Sci. Com.* 1867. *Lib. Com.* 1864-8. *Trans.* 9.

1844 †HUMBY, EDWIN, M.D., 83, Hamilton terrace, St. John's wood. C. 1866-7.

1889 HUMPHERY, FRANCIS WILLIAM, M.A., M.B., 63, Prince's gate, Hyde park.

Elected

1855 HUMPHRY, GEORGE MURRAY, M.D., F.R.S., Surgeon to Addenbrooke's Hospital; Professor of Surgery in the University of Cambridge. *Trans.* 7.

1882 HUMPHRY, LAURENCE, M.B., 3, Trinity street, Cambridge.

1873 HUNTER, SIR W. GUYER, M.D., M.P., Hon. Surgeon to H.M. the Queen; late Principal of, and Professor of Medicine in, Grant Medical College, Bombay; Surgeon-General Bombay Army; 21, Norfolk crescent, Hyde park.

1849 HUSSEY, EDWARD LAW, Consulting Surgeon to the Oxford County Lunatic Asylum and the Warneford Asylum; 24, Winchester Road, Oxford. *Trans.* 1.

1856 †HUTCHINSON, JONATHAN, F.R.S., Consulting Surgeon to, and Emeritus Professor of Surgery at, the London Hospital; Consulting Surgeon to the Royal London Ophthalmic Hospital, Moorfields; and Surgeon to the Hospital for Diseases of the Skin; 15, Cavendish square. C. 1870. V.P. 1882. *Referee*, 1876-81, 1883-8. *Lib. Com.* 1864-5. *Trans.* 14. *Pro.* 2.

1888 HUTCHINSON, JONATHAN, Jun., Assistant Surgeon to the London Hospital; 15, Cavendish square.

1820 HUTCHINSON, WILLIAM, M.D.

1847 IMAGE, WILLIAM EDMUND, Herringswell House, Mildenhall, Suffolk. *Trans.* 1.

1856 INGLIS, CORNELIUS, M.D.

1871 JACKSON, J. HUGHLINGS, M.D., F.R.S., Physician to the London Hospital; Physician to the National Hospital for the Paralysed and Epileptic; 3, Manchester square. C. 1889.

1841 †JACKSON, PAUL, 51, Wellington road, St. John's Wood. C. 1862.

1863 JACKSON, THOMAS VINCENT, Senior Surgeon to the Wolverhampton and Staffordshire General Hospital; Whetstone House, Waterloo road, south, Wolverhampton.

1883 JACOBSON, WALTER HAMILTON ACLAND, B.A., M.B., M.S., Assistant Surgeon to Guy's Hospital; Surgeon to the Royal Hospital for Children and Women; 66, Great Cumberland place, Hyde Park. *Trans.* 1.

Elected

1825 JAMES, JOHN B., M.D.

1883 *JENKINS, EDWARD JOHNSTONE, M.D., The Australian Club, Sydney, New South Wales.

1851 †JENNER, SIR WILLIAM, Bart., M.D., K.C.B., D.C.L., LL.D. F.R.S., Physician in Ordinary to H.M. the Queen, and to H.R.H. the Prince of Wales; Emeritus Professor of Clinical Medicine in University College, London; and Consulting Physician to University College Hospital; Member of the Senate of the University of London; 63, Brook street, Grosvenor square. C. 1864. V.P. 1875. *Referee*, 1855, 1859-63. *Trans.* 3.

1884 JENNINGS, CHARLES EGERTON, M.S., M.B., 15, Upper Brook street, Grosvenor square.

1881 JENNINGS, WILLIAM OSCAR, M.D., 35, Rue Marbœuf, Avenue des Champs-Elysées, Paris.

1884 JESSETT, FREDERIC BOWREMAN, Surgeon to the Royal General Dispensary; 16, Upper Wimpole street.

1883 JESSOP, WALTER H. H., M.B., Demonstrator of Anatomy at St. Bartholomew's Hospital; 73, Harley street.

1851 JOHNSON, EDMUND CHARLES, Corresponding Member of the Medical and Philosophical Society of Florence, and of "l'Institut Génevois."

1847 †JOHNSON, GEORGE, M.D., F.R.S., Physician Extraordinary to H.M. the Queen; Consulting Physician to King's College Hospital; Member of the Senate of the University of London; 11, Savile row, Burlington gardens. C. 1862-3. V.P. 1870. P. 1884-5. L. 1878-80. *Referee*, 1853-61, 1864-9. *Lib. Com.* 1860-1. *Trans.* 10. *Pro.* 1.

1881 JOHNSON, GEORGE LINDSAY, M.A., M.D., Cortina, Netherhall gardens, South Hampstead, and 14, Stratford place, Oxford street.

1889 JOHNSON, HAROLD J., Senior Assistant, Gloucester County Asylum.

1889 JOHNSON, RAYMOND, M.B., B.S., 123, Gower street.

Elected

1884 JOHNSTON, JAMES, M.D., 11, Chester place, Hyde Park square.

1848 JOHNSTONE, ATHOL ARCHIBALD WOOD, Consulting Surgeon to the Royal Alexandra Hospital for Sick Children, St. Moritz House, 61, Dyke road, Brighton. *Lib. Com.* 1860. *Trans.* 1.

1887 JONES, HENRY LEWIS, M.D., Casualty Physician to St. Bartholomew's Hospital, 6, West street, Finsbury Circus.

1876 JONES, LESLIE HUDSON, M.D., Limefield House, Cheetham hill, Manchester.

1875 *JONES, PHILIP SYDNEY, M.D., Consulting Surgeon to the Sydney Infirmary; Examiner in Medicine, and Fellow of the Senate, Sydney University; 10, College street, Sydney, New South Wales. [Agents: Messrs. D. Jones & Co., 1, Gresham buildings, Basinghall street.]

1865 JORDAN, FURNEAUX, Consulting Surgeon to the Queen's Hospital, Birmingham; Selly Hill, Birmingham.

1881 JULER, HENRY EDWARD, Junior Ophthalmic Surgeon to St. Mary's Hospital; 77, Wimpole street, Cavendish square.

1816 KAUFFMANN, GEORGE HERMANN, M.D., Hanover.

1882 KEETLEY, CHARLES R. B., Senior Surgeon to the West London Hospital; Surgeon to the Surgical Aid Society 56, Grosvenor street, Grosvenor square.

1872 KELLY, CHARLES, M.D., Professor of Hygiene in King's College, London, and Medical Officer of Health for the West Sussex Combined Sanitary District; Ellesmere, Gratwicke road, Worthing, Sussex.

1848 *KENDELL, DANIEL BURTON, M.D., Heath House, Wakefield, Yorkshire.

1884 KESER, JEAN SAMUEL, M.D., Surgeon to the French Hospital, Leicester place; 11, Harley street, Cavendish square.

1877 *KHORY, RUSTONJEE NASERWANJEE, M.D., Physician to the Parell Dispensary, Bombay; Girgaum road, Bombay.

1857 KIALLMARK, HENRY WALTER, 5, Pembridge gardens, Bayswater.

Elected

1881 KIDD, PERCY, M.A., M.D., Assistant Physician to the Hospital for Consumption, Brompton; 60, Brook street, Grosvenor square. *Trans.* 4.

1851 †KINGDON, JOHN ABERNETHY, Surgeon to the City of London Truss Society, and Consulting Surgeon to the City Dispensary; 2, New Bank buildings, Lothbury. C. 1866-7. V.P. 1872-3. *Sci. Com.* 1867. *Trans.* 1.

1885 KLEIN, EDWARD EMANUEL, M.D., F.R.S., Lecturer on Physiology, St. Bartholomew's Hospital; 19, Earl's Court square.

1883 KNAPTON, GEORGE, 11, Hoghton street, Southport.

1888 KYNSEY, WILLIAM RAYMOND, C.M.G., Inspector-General of Hospitals, Colombo, Ceylon.

1889 LANCASTER, ERNEST LE CRONIN, M.B., B.C., St. George's Hospital.

1840 †LANE, SAMUEL ARMSTRONG, Consulting Surgeon to St. Mary's Hospital and to the Lock Hospital. C. 1849-50. V.P. 1865. *Referee*, 1850. [Care of Ernest Lane, 10, Cambridge street, Hyde park.]

1884 LANE, WILLIAM ARBUTHNOT, M.S., Assistant Surgeon to Guy's Hospital and to the Hospital for Sick Children; 14, St. Thomas's street, Southwark. *Trans.* 3.

1882 LANG, WILLIAM, Ophthalmic Surgeon to, and Lecturer on Ophthalmic Surgery at, the Middlesex Hospital; Assistant Surgeon to the Royal London Ophthalmic Hospital, Moorfields; 26, Upper Wimpole street, Cavendish square.

1865 LANGTON, JOHN, Surgeon to, and Lecturer on Anatomy at, St. Bartholomew's Hospital; Surgeon to the City of London Truss Society; 62, Harley street, Cavendish square. C. 1881-2. *Referee*, 1885-8. *Lib. Com.* 1879-80, 1888. *Trans.* 2.

1873 *LARCHER, O., M.D., Laureate of the Institute of France, of the Medical Faculty, and Academy of Paris, &c.; 97, Rue de Passy, Passy, Paris.

Elected

1862 LATHAM, PETER WALLWORK, M.A., M.D., Downing Professor of Medicine, Cambridge University; Physician to Addenbrooke's Hospital, Cambridge; 17, Trumpington street, Cambridge.

1816 LAWRENCE, G. E.

1888 LAWRENCE, LAURIE ASHER, 125, Harley street, Cavendish square.

1884 LAWSON, GEORGE, Surgeon-Oculist to H.M. the Queen; Surgeon to the Royal London Ophthalmic Hospital and to the Middlesex Hospital; 12, Harley street, Cavendish square.

1880 LAYCOCK, GEORGE LOCKWOOD, M.B., Melbourne, Victoria, Australia.

1886 *LEDIARD, HENRY AMBROSE, M.D., Surgeon to the Cumberland Infirmary; 41, Lowther street, Carlisle.

1882 LEDWICH, EDWARD L'ESTRANGE, Lecturer on Surgical and Descriptive Anatomy in the Ledwich School of Medicine, Dublin; 23, Upper Leeson Street, Dublin.

1843 †LEE, HENRY, Consulting Surgeon to St. George's Hospital; 9, Savile row, Burlington gardens. C. 1856-7. L. 1863-4. V.P. 1868-9. *Referee*, 1855, 1866-8. *Sci. Com.* 1867. *Trans.* 14. *Pro.* 2.

1884 LEE, ROBERT JAMES, M.D., 6, Savile row.

1883 LEESON, JOHN RUDD, M.D., C.M., 6, Clifden road, Twickenham.

1869 LEGG, JOHN WICKHAM, M.D., C. 1886. *Referee*, 1882-5. *Lib. Com.* 1878-85. *Trans.* 2.

1836 LEIGHTON, FREDERICK, M.D.

1886 LEWERS, ARTHUR HAMILTON NICHOLSON, M.D., Assistant Obstetric Physician to the London Hospital and Physician to Out-patients of Queen Charlotte's Lying-in Hospital; 60, Wimpole street, Cavendish square.

1872 LIEBREICH, RICHARD, Consulting Ophthalmic Surgeon to St. Thomas's Hospital; Paris.

Elected

1878 LISTER, SIR JOSEPH, Bart., D.C.L., LL.D., F.R.S., Surgeon Extraordinary to H.M. the Queen; Professor of Clinical Surgery at King's College, London; and Surgeon to King's College Hospital; 12, Park crescent, Regent's Park.

1872 *LITTLE, DAVID, M.D., Senior Surgeon to the Royal Eye Hospital, Manchester; 21, St. John street, Manchester.

1889 *LITTLE, JAMES, M.D., Physician to the Adelaide Hospital; 14, Stephen's Green North, Dublin.

1889 LITTLE, JOHN FLETCHER, M.B., 60, Welbeck street, Cavendish square.

1871 LITTLE, LOUIS STROMEYER, Shanghai, China.

1819 LLOYD, ROBERT, M.D.

1820 LOCHER, J. G., M.C.D., Town Physician of Zurich. *Trans.* 2.

1881 LOCKWOOD, CHARLES BARRETT, Surgeon to the Great Northern Central Hospital, and Demonstrator of Anatomy and Operative Surgery at St. Bartholomew's Hospital; 19, Upper Berkeley street. *Trans.* 1.

1860 LONGMORE, SIR THOMAS, C.B., Hon. Surgeon to H.M. the Queen; Surgeon-General, Army Medical Staff, and Professor of Military Surgery, Army Medical School, Netley, Southampton; Foreign Associate "Académie de Médecine;" Woolston Lawn, Woolston, Hants. *Trans.* 2.

1836 LÖWENFELD, JOSEPH S., M.D., Berbice.

1871 LOWNDS, THOMAS MACKFORD, M.D., late Professor of Anatomy and Physiology at Grant Medical College, Bombay; Egham Hill, Surrey.

1881 LUCAS, RICHARD CLEMENT, B.S., M.B., Surgeon to, and Lecturer on Anatomy at, Guy's Hospital; Surgeon to the Evelina Hospital for Sick Children; 18, Finsbury square.

1888 LUFF, ARTHUR PEARSON, M.B., B.Sc., 35, Westbourne terrace, Hyde Park.

Elected

1883 LUND, EDWARD, Professor of Surgery, and Member of Senate, Victoria University, Manchester; Consulting Surgeon to the Manchester Royal Infirmary; 22, St. John street, Manchester.

1887 LUSH, PERCY J. F., M.B., Fitzjohn's Mansions, South Hampstead.

1857 LYON, FELIX WILLIAM, M.D., 7, South Charlotte street, Edinburgh.

1867 MABERLY, GEORGE FREDERICK, Mailai Valley, Nelson, New Zealand.

1889 MACALISTER, DONALD, M.A., B.Sc., M.D., Physician to Addenbrooke's Hospital; Lecturer on Medicine, St. John's College; University Lecturer in Medicine; St. John's College, Cambridge.

1873 MACCARTHY, JEREMIAH, M.A., Surgeon to the London Hospital and Lecturer on Physiology at the London Hospital Medical College; 15, Finsbury square. C. 1886-7. *Lib. Com.* 1882-5.

1867 MAC CORMAC, SIR WILLIAM, M.A., Surgeon to, and Lecturer on Surgery at, St. Thomas's Hospital; 13, Harley street. C. 1884-5. *Trans.* 1.

1887 MACDONALD, GEORGE CHILDS, M.D.

1880 MACFARLANE, ALEXANDER WILLIAM, M.D., Examiner in Medical Jurisprudence, University of Glasgow; 6, Manchester Square.

1866 MACGOWAN, ALEXANDER THORBURN, M.D., Vyvyan House, Clifton, near Bristol.

1880 MCHARDY, MALCOLM MACDONALD, Ophthalmic Surgeon to King's College Hospital, and Professor of Ophthalmic Surgery in King's College, London; Surgeon to the Royal South London Ophthalmic Hospital; 5, Savile row.

1822 MACINTOSH, RICHARD, M.D.

1859 *M'INTYRE, JOHN, M.D., LL.D., Odiham, Hants.

Elected

1873 MacKellar, Alexander Oberlin, M.S.I., Surgeon to St. Thomas's Hospital; Surgeon-in-Chief to the Metropolitan Police Force; 7, Cavendish place, Cavendish square].

1881 Mackenzie, Stephen, M.D., Physician to the London Hospital, and Lecturer on the Principles and Practice of Medicine at the London Hospital Medical College; Physician to the Royal London Ophthalmic Hospital; 18, Cavendish square. *Trans.* 1.

1885 Mackern, John, M.D., Assistant Physician to the Chelsea Hospital for Women; 30, Cambridge street, Hyde park.

1876 Mackey, Edward, M.D., Assistant Physician to the Sussex County Hospital; 1, Brunswick road, Hove, Brighton.

1854 *Mackinder, Draper, M.D., Consulting Surgeon to the Dispensary, Gainsborough, Lincolnshire.

1879 Maclagan, Thomas John, M.D., Physician-in-Ordinary to their R.H. the Prince and Princess Christian of Schleswig-Holstein; 9, Cadogan place, Belgrave square.

1889 MacLehose, Norman MacMillan, M.B., C.M., 24, Devonshire street, Portland place.

1876 Macnamara, Charles N., Surgeon to, and Lecturer on Surgery at, the Westminster Hospital; Surgeon to the Royal Westminster Ophthalmic Hospital; Surgeon-Major Bengal Medical Service; Fellow of the Calcutta University; 13, Grosvenor street. *Referee*, 1884-8. *Lib. Com.* 1886-8.

1881 Macready, Jonathan Forster Christian Horace, Surgeon to the Great Northern Hospital; 51, Queen Anne street, Cavendish square.

1880 Maddick, Edmund Distin, 2, Chandos street, Cavendish square.

1886 Maguire, Robert, M.D., 4, Seymour street, Portman square.

1880 Makins, George Henry, Assistant Surgeon to St. Thomas's Hospital and to the Evelina Hospital for Children; 2, Queen street, May Fair. *Trans.* 1.

Elected

1885 MALCOLM, JOHN DAVID, M.B., Surgeon in charge of Out-Patients, Samaritan Free Hospital; 24, Bryanston street, Portman square. *Trans.* 1.

1888 MAPOTHER, EDWARD DILLON, M.D., 32, Cavendish square.

1855 MARCET, WILLIAM, M.D., F.R.S., Flowermead, Wimbledon Park, and Athenæum Club, Pall Mall. C. 1871. *Referee*, 1866-70, 1883-6. *Sci. Com.* 1863. *Lib. Com.* 1866-8. *Trans.* 3.

1867 MARSH, F. HOWARD, Assistant Surgeon to, and Lecturer on Anatomy at, St. Bartholomew's Hospital; 30, Bruton street, Berkeley square. C. 1882-3, 1889. S. 1885-7. *Lib. Com.* 1880-1. *Trans.* 4.

1851 †MARSHALL, JOHN, F.R.S., Professor of Anatomy to the Royal Academy of Arts; Emeritus Professor of Surgery in University College, London, and Consulting Surgeon to University College Hospital; 10, Savile row, Burlington gardens. C. 1866. V.P. 1875-6. P. 1882-3. *Referee*, 1867, 1871-4, 1877-81. *Trans.* 3.

1884 MARTIN, SIDNEY HARRIS COX, M.D.; 10, Mansfield street, Portland place.

1883 MAUDSLEY, HENRY CARR, M.D., 11, Spring street, Melbourne, Victoria.

1839 MEADE, RICHARD HENRY, Consulting Surgeon to the Bradford Infirmary; Bradford, Yorkshire. *Trans.* 1.

1865 MEDWIN, AARON GEORGE, M.D., Consulting Dental Surgeon to the Royal Kent Dispensary, 34, Bruton street, Berkeley square.

1880 MEREDITH, WILLIAM APPLETON, M.B., C.M., Surgeon to the Samaritan Free Hospital for Women and Children; 6, Queen Anne street, Cavendish square. *Trans.* 1.

1874 MERRIMAN, JOHN J., 45, Kensington square.

1815 MEYER, AUGUSTUS, M.D., St. Petersburg.

1840 MIDDLEMORE, RICHARD, Consulting Surgeon to the Birmingham Eye Hospital; The Limes, Bristol road, Edgbaston, Birmingham.

Elected

1854 MIDDLESHIP, EDWARD ARCHIBALD.

1885 MILLICAN, KENNETH WILLIAM, B.A., 36, Bruton street, Berkeley square, W.

1882 MILLS, JOSEPH, 28, Queen Anne street, Cavendish square.

1873 MILNER, EDWARD, Surgeon to the Lock Hospital; 32, New Cavendish street, Portland place.

1887 MIVART, FREDERICK ST. GEORGE, Beaumont Lodge, Worple road, Wimbledon.

1883 MONEY, ANGEL, M.D., Assistant Physician to University College Hospital, to the Hospital for Sick Children, Great Ormond Street, and to the City of London Hospital for Diseases of the Chest, Victoria Park; 24 Harley street, Cavendish square. *Trans.* 4.

1873 MOORE, NORMAN, M.D., Assistant Physician and Warden of the College, and Lecturer on Pathology at, St. Bartholomew's Hospital; The Warden's House, St. Bartholomew's Hospital. *Referee*, 1886-8.

1857 MORGAN, JOHN, 3, Sussex place, Hyde park gardens. C. 1880-1. *Lib. Com.* 1862-3. *Trans.* 1.

1861 MORGAN, JOHN EDWARD, M.D., Physician to the Manchester Royal Infirmary, and Professor of Medicine in the Victoria University, Manchester; 1, St. Peter's square, Manchester.

1878 MORGAN, JOHN HAMMOND, M.A., Surgeon to the Charing Cross Hospital and to the Hospital for Sick Children, Great Ormond street; 68, Grosvenor street. *Trans.* 1.

1874 MORRIS, HENRY, M.A., Surgeon to, and Lecturer on Surgery at, the Middlesex Hospital; 2, Mansfield street, Portland place. C. 1888-9. *Referee*, 1882-7. *Trans.* 10.

1879 MORRIS, MALCOLM ALEXANDER, Surgeon to the Skin Department of, and Lecturer on Dermatology at, St. Mary's Hospital; 8, Harley street, Cavendish square. *Sci. Com.* 1889.

1885 MOTT, FREDERICK WALKER, M.D., Lecturer on Physiology, Charing Cross Hospital; Meadowlead, Gayton road, Harrow.

Elected

1879 MUNK, WILLIAM, M D., Harveian Librarian, Royal College of Physicians; Consulting Physician to the Royal Hospital for Incurables; 40, Finsbury square.

1888 MURRAY, HUBERT MONTAGUE, M.D., 27, Savile row, Burlington gardens.

1873 MURRAY, J. IVOR, M.D., F.R.S.Ed. 24, Huntriss row, Scarborough.

1880 MURRELL, WILLIAM, M.D., Assistant Physician to the Royal Hospital for Diseases of the Chest; Assistant Physician to, and Lecturer on Materia Medica and Therapeutics at, the Westminster Hospital; 38, Weymouth street, Portland place. *Sci. Com.* 1889. *Trans.* 1.

1863 MYERS, ARTHUR BOWEN RICHARDS, Brigade-Surgeon, Brigade of Guards; 43, Gloucester street, Warwick square. C. 1878-9. *Lib. Com.* 1877.

1882 MYERS, ARTHUR THOMAS, M.D., 9, Lower Berkeley street, Portman square.

1889 NAPIER, FRANCIS HORATIO, M.B., 31, Lower Seymour street, Portman square.

1881 NALL, SAMUEL, M.B., Disley, Stockport, Cheshire.

1870 NEILD, JAMES EDWARD, M.D., Lecturer on Forensic Medicine in the University of Melbourne; 166, Collins street east, Melbourne, Victoria.

1889 NEVINS, ARTHUR EDWARD, 3, Abercromby square, Liverpool.

1877 NETTLESHIP, EDWARD, Ophthalmic Surgeon to, and Lecturer on Ophthalmology at, St. Thomas's Hospital; Assistant Surgeon to the Royal London Ophthalmic Hospital; 5, Wimpole street, Cavendish square.

1843 †NEWTON, EDWARD, 85, Gloucester terrace, Hyde Park. C. 1863-4.

1868 NICHOLLS, JAMES, M.D., Trenanen, Newquay, Cornwall.

Elected

1849 NORMAN, HENRY BURFORD, Portland Lodge, Southsea, Hants. *Lib. Com.* 1857.

1847 *NOURSE, WILLIAM EDWARD CHARLES, Bouverie House, Exeter.

1864 NUNN, THOMAS WILLIAM, Consulting Surgeon to the Middlesex Hospital; 8, Stratford place, Oxford street.

1870 NUNNELEY, FREDERICK BARHAM, M.D. *Trans.* 2.

1884 OAKES, ARTHUR, M.D., 99, Priory road, West Hampstead.

1880 O'CONNOR, BERNARD, A.B., M.D.. Physician to the North London Hospital for Consumption; Greenhill Park, Harlesden.

1847 O'CONNOR, THOMAS, March, Cambridgeshire.

1880 OGILVIE, GEORGE, M.B., Lecturer on Experimental Physics at the Westminster Hospital; Physician to the Hospital for Epilepsy and Paralysis, Regent's Park; 22, Welbeck street, Cavendish square.

1880 OGILVIE, LESLIE, M.B., Physician to the Paddington Green Children's Hospital; 46, Welbeck street, Cavendish square.

1858 OGLE, JOHN WILLIAM, M.D., Consulting Physician to St. George's Hospital; 30, Cavendish square. C. 1873. V.P. 1886. *Referee*, 1864-72. *Trans.* 4.

1855 *OGLE, WILLIAM, M.A., M.D., Physician to the Derbyshire Infirmary; The Elms, Duffield road, Derby.

1860 OGLE, WILLIAM, M.D., Superintendent of Statistics in the Registrar-General's Department, Somerset House; 10, Gordon street, Gordon square. S. 1868-70. C. 1876-7. V.P. 1887. *Lib. Com.* 1871-5. *Trans.* 5.

1870 OLDHAM, CHARLES FREDERIC, India [Agents: Messrs. Grindlay and Co., 55, Parliament street].

1883 *OLIVER, THOMAS, M.D., Lecturer on Practical Physiology, University of Durham; and Physician to the Newcastle-upon-Tyne Infirmary; 12, Eldon square, Newcastle-on-Tyne.

Elected

1871 *O'NEILL, WILLIAM, M.D., Physician to the Lincoln Lunatic Hospital, Silver street, Lincoln.

1873 ORD, WILLIAM MILLER, M.D., Physician to, and Lecturer on Medicine at, St. Thomas's Hospital; 37, Upper Brook street, Grosvenor square. C. 1889. *Sci. Com.* 1889. *Referee*, 1884-8. *Trans.* 6.

1877 ORMEROD, JOSEPH ARDERNE, M.D., Assistant Physician to the National Hospital for the Paralysed and Epileptic, Queen square, and to the City of London Hospital for Diseases of the Chest, Victoria Park; 25, Upper Wimpole street. *Trans.* 1.

1885 ORMSBY, L. HEPENSTAL, M.D., Lecturer on Clinical and Operative Surgery and Surgeon to the Meath Hospital and County Dublin Infirmary; Surgeon to the Children's Hospital, Dublin; 92, Merrion square west, Dublin.

1879 OWEN, EDMUND, Senior Surgeon to, and Joint Lecturer on Surgery at St. Mary's Hospital; Surgeon to the Hospital for Sick Children, Great Ormond street; 49, Seymour street, Portman square. *Trans.* 2.

1882 OWEN, HERBERT ISAMBARD, M.D., Assistant Physician to, and Lecturer on Forensic Medicine at, St. George's Hospital; 5, Hertford street, May Fair.

1874 PAGE, HERBERT WILLIAM, M.A., M.C., Surgeon to, and Joint Lecturer on Surgery at, St. Mary's Hospital; 146, Harley street, Cavendish square. *Referee*, 1884-8. *Lib. Com.* 1886-8. *Trans.* 4.

1887 PAGET, CHARLES EDWARD, Town Hall, Salford.

1840 †PAGET, SIR JAMES, Bart., D.C.L., LL.D., F.R.S., Sergeant-Surgeon to H.M. the Queen; Surgeon-in-Ordinary to H.R.H. the Prince of Wales; Consulting Surgeon to St. Bartholomew's Hospital; Vice-Chancellor of the University of London; Foreign Associate of the 'Académie de Médecine,' Paris; 1, Harewood place, Hanover square. C. 1848-9. V.P. 1861. T. 1867. P. 1875-6. *Referee*, 1844-6, 1848, 1851-60, 1862-6, 1868-74. *Sci. Com.* 1863. *Lib. Com.* 1846-7. *Trans.* 12.

Elected

1886 PAGET, STEPHEN, 57, Wimpole street, Cavendish square.

1858 *PALEY, WILLIAM, M.D., Physician to the Ripon Dispensary; The Old Residence, Ripon, Yorkshire.

1887 PARDINGTON, GEORGE LUCAS, M.D., 47, Mount Pleasant road, Tunbridge Wells.

1873 PARKER, ROBERT WILLIAM, Surgeon to the East London Hospital for Children; 8, Old Cavendish street. C. 1888-9. *Lib. Com.* 1885-7. *Trans.* 4.

1885 PARKER, RUSHTON, M.B., B.S., Professor of Surgery, University College, Liverpool (Victoria University); Surgeon to the Liverpool Royal Infirmary; 59, Rodney street, Liverpool.

1883 PASTEUR, WILLIAM, M.D., Medical Registrar to the Middlesex Hospital; Physician to the North-Eastern Hospital for Children; 19, Queen street, May Fair.

1865 PAVY, FREDERICK WILLIAM, M.D., F.R.S., Physician to Guy's Hospital; 35, Grosvenor street. C. 1883-4. *Referee*, 1871-82. *Trans.* 1.

1869 PAYNE, JOSEPH FRANK, M.D., Physician to, and Lecturer on Pathological Anatomy at, St. Thomas's Hospital; 78, Wimpole street, Cavendish square. C. 1887. *Sci. Com.* 1879. *Lib. Com.* 1878-85, 1889.

1887 PEARCE, WALTER, M.D., 63, Montagu square.

1879 PEEL, ROBERT, 120, Collins street east, Melbourne, Victoria.

1856 PEIRCE, RICHARD KING, Laggan House, Maidenhead.

1830 PELECHIN, CHARLES P., M.D., St. Petersburg.

1855 *PEMBERTON, OLIVER, Senior Surgeon to the Birmingham General Hospital, and Professor of Surgery at the Queen's College, Birmingham; 11, Temple row, Birmingham. *Trans.* 1.

1874 PENHALL, JOHN THOMAS, 5, Eversfield place, St. Leonard's, Sussex.

1887 PENROSE, FRANCIS GEORGE, M.D., Assistant Physician to St. George's Hospital; 24, Clarges street, Piccadilly.

Elected

1879 *PESIKAKA, HORMASJI DOSABHAI, Marine Lines, Bombay.

1878 *PHILIPSON, GEORGE HARE, M.D., M.A., D.C.L., Professor of Medicine at Durham University; Senior Physician to the Newcastle-upon-Tyne Infirmary; 7, Eldon square, Newcastle-upon-Tyne.

1883 PHILLIPS, CHARLES DOUGLAS F., M.D., F.R.S.Ed., 10, Henrietta street, Cavendish square, W.

1884 PHILLIPS, GEORGE RICHARD TURNER, 24, Leinster square, Bayswater.

1888 PHILLIPS, JOHN, M.B., Physician to the British Lying-in Hospital; 71, Grosvenor street, Grosvenor square.

1889 PHILLIPS, SIDNEY, M.D., Senior Physician to Out-patients at St. Mary's Hospital, and Assistant Physician to the London Fever Hospital; 21, Upper Berkeley street, Portman square.

1867 PICK, THOMAS PICKERING, Surgeon to, and Lecturer on Surgery at, St. George's Hospital; 18, Portman street, Portman square. C. 1884-5. *Referee*, 1882-3. *Sci. Com.* 1870. *Lib. Com.* 1879-81.

1841 †PITMAN, SIR HENRY ALFRED, M.D., Consulting Physician to St. George's Hospital; Cranbrook, Bycullah park, Enfield. L. 1851-3. C. 1861-2. T. 1863-8. V.P. 1870-1. *Referee*, 1849-50. *Lib. Com.* 1847.

1884 PITT, GEORGE NEWTON, M.D., Assistant Physician to, and Pathologist at, Guy's Hospital; 10, St. Thomas's street, Southwark.

1885 POLAND, JOHN, Demonstrator of Anatomy, Guy's Hospital; 16, St. Thomas's street, Southwark.

1884 POLLARD, BILTON, Assistant Surgeon and Surgical Registrar to University College Hospital, Surgeon to the North Eastern Hospital for Children; 24, Harley street, Cavendish square. *Trans.* 1.

1871 POLLOCK, ARTHUR JULIUS, M.D., Senior Physician to, and Lecturer on the Principles and Practice of Medicine at, Charing Cross Hospital; Physician to the Foundling Hospital. C. 1889. 85, Harley street, Cavendish square.

Elected

1845 †POLLOCK, GEORGE DAVID, Surgeon-in-Ordinary to H.R.H. the Prince of Wales; Consulting Surgeon to St. George's Hospital; 36, Grosvenor street. C. 1856-7. L. 1859-62. V.P. 1870-1. P. 1886-7. *Referee*, 1858, 1864-9, 1877-85. *Trans.* 5.

1865 POLLOCK, JAMES EDWARD, M.D., Consulting Physician to the Hospital for Consumption, Brompton; 52, Upper Brook street, Grosvenor square. C. 1882-3. *Referee*, 1872-81.

1871 POORE, GEORGE VIVIAN, M.D., Professor of Medical Jurisprudence in University College, London; Physician to University College Hospital; Consulting Physician to the Royal Infirmary for Children and Women, Waterloo road; 30, Wimpole street. *Referee*, 1887-8. *Trans.* 2.

1885 PORT, HEINRICH, M.D., Physician to the German Hospital; 48, Finsbury square.

1846 POTTER, JEPHSON, M.D., F.L.S.

1842 POWELL, JAMES, M.D.

1867 POWELL, RICHARD DOUGLAS, M.D., Physician Extraordinary to H.M. the Queen, Physician to, and Lecturer on Practical Medicine at, the Middlesex Hospital; 62, Wimpole street, Cavendish square. S. (Oct.), 1883-5. C. 1887-8. *Referee* 1879-83, 1886. *Trans.* 3.

1887 POWER, D'ARCY, M.A., M.B., Demonstrator of Practical Surgery at St. Bartholomew's Hospital; Surgeon to Out-patients at Victoria Hospital for Children; 26, Bloomsbury square.

1867 POWER, HENRY, Senior Ophthalmic Surgeon to, and Lecturer on Ophthalmic Surgery at, St. Bartholomew's Hospital; 37A, Great Cumberland place, Hyde park. C. 1882-3. *Referee*, 1870-81. *Sci. Com.* 1870. *Lib. Com.* 1872-8.

1857 PRIESTLEY, WILLIAM OVEREND, M.D., LL.D., Consulting Physician to King's College Hospital, and to the St. Marylebone Infirmary; 17, Hertford street, Mayfair. C. 1874-5. V.P. 1884-5. *Referee*, 1867-73, 1877-83. *Sci. Com.* 1863.

Elected

1883 PRINGLE, JOHN JAMES, M.B., C.M., Assistant Physician to, and Physician in Charge of Skin Department at, the Middlesex Hospital, and Physician to the Royal Hospital for Diseases of the Chest; 35, Bruton street, Berkeley square. *Trans.* 1.

1874 PURVES, WILLIAM LAIDLAW, Aural Surgeon to Guy's Hospital; 20, Stratford place, Oxford street. *Trans.* 2.

1878 PYE, WALTER, Surgeon (with charge of out-patients) to St. Mary's Hospital and to the Victoria Hospital for Children; 4, Sackville street, Piccadilly.

1877 PYE-SMITH, PHILIP HENRY, M.D., F.R.S., Physician to, and Lecturer on Medicine at, Guy's Hospital; Member of the Senate of the University of London; 54, Harley street, Cavendish square. *Lib. Com.* 1887-8.

1850 †QUAIN, RICHARD, M.D., LL.D.Ed., F.R.S., Physician Extraordinary to H.M. the Queen; Consulting Physician to the Hospital for Consumption, Brompton; Member of the Senate of the University of London; 67, Harley street, Cavendish square. C. 1866-7. V.P. 1878-9. *Sci. Com.* 1863. *Trans.* 1.

1871 RALFE, CHARLES HENRY, M.D., M.A., Assistant Physician to the London Hospital, and late Physician to the Seamen's Hospital, Greenwich; 26, Queen Anne street, Cavendish square. C. 1889. *Referee*, 1885-8.

1857 RANKE, HENRY, M.D., 3, Sophienstrasse, Munich.

1854 RANSOM, WILLIAM HENRY, M.D., F.R.S., Physician to the Nottingham General Hospital, Nottingham.

1869 READ, THOMAS LAURENCE, 11, Petersham terrace, Queen's gate.

1858 †REED, FREDERICK GEORGE, M.D., 46, Hertford street, Mayfair. *Trans.* 1.

1821 REEDER, HENRY, M.D., Varick, Seneca County, New York, United States.

1882 REID, JAMES, M.D., C.B., Resident Physician in Ordinary to H.M. the Queen, Windsor Castle.

Elected

1884 REID, THOMAS WHITEHEAD, Surgeon to the Kent and Canterbury Hospital; St. George's House, Canterbury, Kent.

1855 †REYNOLDS, JOHN RUSSELL, M.D., F.R.S., Physician-in-Ordinary to H.M.'s Household; Consulting-Physician to University College Hospital; 38, Grosvenor street. C. 1870. V.P. 1883. *Referee*, 1867-9.

1865 RHODES, GEORGE WINTER, Surgeon to the Huddersfield Infirmary; Queen street south, Huddersfield.

1881 RICE, GEORGE, M.B., C.M., Sutton, Surrey.

1887 RICHARDSON, GILBERT, M.D., Thornton, Upper Richmond road, Putney.

1863 RINGER, SYDNEY, M.D., F.R.S., Holme Professor of Clinical Medicine in University College, London, and Physician to University College Hospital; 15, Cavendish place, Cavendish square. C. 1881-2. *Referee*, 1873-80. *Trans.* 6.

1889 RIVERS, W. H. RIVERS, M.D., St. Bartholomew's Hospital.

1871 RIVINGTON, WALTER, M.S., Surgeon to, and Lecturer on Surgery at, the London Hospital; 22, Finsbury square. C. 1885-6. *Trans.* 4.

1871 *ROBERTS, DAVID LLOYD, M.D., Obstetric Physician to the Manchester Royal Infirmary, Physician to St. Mary's Hospital, Manchester; 11, St. John street, Manchester.

1878 ROBERTS, FREDERICK THOMAS, M.D., Professor of Materia Medica and Therapeutics in University College, London; and Physician to University College Hospital; Physician to the Hospital for Consumption, Brompton; 102, Harley street, Cavendish square.

1889 ROBERTS, HUGH LESLIE, M.B., C.M., 8, Harley street, Cavendish square.

1889 ROBERTS, SIR WILLIAM, M.D., B.A., F.R.S., 8, Manchester square.

1857 ROBERTSON, JOHN CHARLES GEORGE, Medical Superintendent of the Cavan District Lunatic Asylum; Monaghan, Ireland.

Elected

1873 ROBERTSON, WILLIAM HENRY, M.D., Consulting Physician to the Buxton Bath Charity and Devonshire Hospital; Buxton, Derbyshire.

1888 *ROBINSON, FREDERICK WILLIAM, M.B., C.M., Huddersfield.

1885 ROCKWOOD, WILLIAM GABRIEL, M.D., Colombo, Ceylon.

1850 ROPER, GEORGE, M.D., Consulting Physician to the Eastern Division of the Royal Maternity Charity; and to the Royal Infirmary for Children and Women, Waterloo Bridge road; Oulton Lodge, Aylsham, Norfolk. C. 1879-80.

1857 †ROSE, HENRY COOPER, M.D., F.L.S., Consulting Surgeon to the Hampstead Dispensary; Penrose House, Hampstead. C. 1886-7. *Trans.* 1.

1883 ROSE, WILLIAM, M.B., Professor of Surgery at King's College, Surgeon to King's College Hospital and to the Royal Free Hospital; 17, Harley street, Cavendish square.

1888 ROUGHTON, EDMUND WILKINSON, M.B., B.S., 28, Welbeck street, Cavendish square.

1882 ROUTH, AMAND JULES MCCONNEL, M.D., B.S., Physician to the Samaritan Free Hospital for Women; Assistant Obstetric Physician to the Charing Cross Hospital; 14A, Manchester square.

1849 †ROUTH, CHARLES HENRY FELIX, M.D., Consulting Physician to the Samaritan Free Hospital for Women and Children; 52, Montagu square. *Lib. Com.* 1854-5. *Trans.* 1.

1863 ROWE, THOMAS SMITH, M.D., Senior Visiting Surgeon to the Royal Sea-Bathing Infirmary; Cecil street, Margate, Kent.

1882 ROY, CHARLES SMART, M.D., F.R.S., Professor of Pathology in the University of Cambridge; Trinity College, Cambridge.

1871 RUTHERFORD, WILLIAM, M.D., F.R.S., Professor of the Institutes of Medicine in the University of Edinburgh; 14, Douglas crescent, Edinburgh.

Elected

1886 SAINSBURY, HARRINGTON, M.D., Physician to the Royal Free Hospital and Assistant Physician to the City of London Hospital for Diseases of the Chest; 63, Welbeck street, Cavendish square. *Trans.* 1.

1856 SALTER, S. JAMES A., M.B., F.R.S., F.L.S., Basingfield, near Basingstoke, Hants. C. 1871. *Lib. Com.* 1878. *Trans.* 2.

1849 †SANDERSON, HUGH JAMES, M.D., 26, Upper Berkeley street, Portman square. C. 1872-3. *Lib. Com.* 1862-3.

1855 †SANDERSON, JOHN BURDON, M.D., LL.D., D.C.L. Durham, F.R.S., Waynflete Professor of Physiology in the University of Oxford; 50, Banbury road, Oxford. C. 1869-70. V.P. 1882. *Referee*, 1867-8, 1876-81. *Sci. Com.* 1862, 1870. *Lib. Com.* 1876-81. *Trans.* 2.

1867 SANDFORD, FOLLIOTT JAMES, M.D., Market Drayton, Shropshire.

1879 SANGSTER, ALFRED, B.A., M.B., Physician to the Skin Department, and Demonstrator of Skin Diseases at the Charing Cross Hospital; 6, Savile row. *Trans.* 1.

1869 SANSOM, ARTHUR ERNEST, M.D., Senior Physician to the North-Eastern Hospital for Children; Physician (with charge of out-patients) to the London Hospital; 84, Harley street, Cavendish square. C. 1887-8. *Trans.* 2.

1886 SAUNDBY, ROBERT, M.D., Physician to the General Hospital, and Consulting Physician to the Hospital for Women, and to the Eye Hospital, Birmingham; 83A, Edmund street, Birmingham.

1845 †SAUNDERS, SIR EDWIN, Surgeon-Dentist to H.M. the Queen, and to their R.H. the Prince and Princess of Wales; 13A, George street, Hanover square. C. 1872-3.

1834 SAUVAN, LUDWIG V., M.D., Warsaw.

1879 SAVAGE, GEORGE HENRY, M.D., 3, Henrietta street, Cavendish square.

Elected

1859 SAVORY, WILLIAM SCOVELL, F.R.S., Surgeon Extraordinary to H.M. the Queen, Surgeon to, and Lecturer on Surgery at, St. Bartholomew's Hospital; Surgeon to Christ's Hospital; 66, Brook street, Grosvenor square. C. 1871-2. L. 1878. V.P. 1883-4. *Referee*, 1865-70, 1873-77, 1879-82. *Sci. Com.* 1862, 1867, 1870. *Lib. Com.* 1866-8. *Trans.* 8.

1883 SCHÄFER, EDWARD ALBERT, F.R.S., Jodrell Professor of Physiology, University College, London; University College, Gower street. *Referee*, 1888.

1887 SCOTT, HARRY, M.D., 28, Great Smith street, Westminster.

1861 *SCOTT, WILLIAM, M.D., Senior Physician to the Huddersfield Infirmary; Waverley House, Huddersfield.

1882 SCRIVEN, JOHN BARCLAY, Brigade Surgeon, Bengal (retired), late Professor of Anatomy, Surgery, and Ophthalmic Surgery at the Lahore Medical School; 95, Oxford gardens, Notting hill.

1863 SEDGWICK, WILLIAM, 101, Gloucester place, Portman square. C. 1884-5. *Trans.* 3.

1877 SEMON, FELIX, M.D., Assistant Physician for Diseases of the Throat to St. Thomas's Hospital; 39, Wimpole street, Cavendish square. *Trans.* 1.

1875 SEMPLE, ROBERT HUNTER, M.D., Consulting Physician to the Bloomsbury Dispensary; 8, Torrington square. *Sci. Com.* 1879.

1873 *SHAPTER, LEWIS, B.A., M.B., Physician to the Devon and Exeter Hospital; the Barnfield, Exeter.

1882 SHARKEY, SEYMOUR JOHN, M.D., Assistant Physician, Joint Lecturer on Pathology, and Demonstrator of Morbid Anatomy, to St. Thomas's Hospital; 2, Portland place. *Trans.* 2.

1840 SHARP, WILLIAM, M.D., F.R.S., Horton House, Rugby. *Trans.* 1.

Elected

1836 †SHAW, ALEXANDER, Consulting Surgeon to the Middlesex Hospital; 136, Abbey road, Kilburn. C. 1842. S. 1843-4. V.P. 1851-2. T. 1858-60. *Referee*, 1842-3, 1846-50, 1855-7, 1865. *Lib. Com.* 1843. *Trans.* 4.

1886 SHAW, LAURISTON ELGIE, M.D., Assistant Physician, Medical Registrar, and Demonstrator of Practical Medicine at Guy's Hospital; 15, St. Thomas's street, Southwark.

1884 SHEILD, ARTHUR MARMADUKE, M.B., B.S., Assistant Surgeon, Charing Cross Hospital; 20, Stratford place, Oxford street. *Trans.* 1.

1859 SIBLEY, SEPTIMUS WILLIAM, 7, Harley street, Cavendish square. C. 1882-3. *Sci. Com.* 1863. *Trans.* 4.

1887 SIDEBOTHAM, EDWARD JOHN, M.B., 123, Pall Mall.

1848 †SIEVEKING, SIR EDWARD HENRY, M.D., LL.D., *President*, Physician-in-Ordinary to H.M. the Queen; Physician-in-Ordinary to H.R.H. the Prince of Wales; Consulting Physician to St. Mary's Hospital; 17, Manchester square. C. 1859-60. S. 1861-3. V.P. 1873-4. L. 1881-2. P. 1888-9. *Referee*, 1855-8, 1864-72, 1875-80. *Sci. Com.* 1862. *Trans.* 2.

1886 SILCOCK, ARTHUR QUARRY, M.D., B.S., Surgeon in charge of out-patients, St. Mary's Hospital; Assistant Surgeon, Royal London Ophthalmic Hospital; 52, Harley street, Cavendish square.

1842 †SIMON, Sir JOHN, K.C.B., D.C.L., LL.D., F.R.S., Consulting Surgeon to St. Thomas's Hospital; 40, Kensington square. C. 1854-5. V.P. 1865. *Referee* 1851-3, 1866-81. *Trans.* 1.

1857 SIORDET, JAMES LEWIS, M.B., Villa Preti, Mentone, Alpes Maritimes, France.

1879 SMITH, E. NOBLE, Senior Surgeon and Surgeon to the Orthopædic Department of the Farringdon Dispensary; Orthopædic Surgeon to the British Home for Incurables; 24, Queen Anne street, Cavendish square.

Elected.

1881 SMITH, EUSTACE, M.D., Physician to H.M. the King of the Belgians; Physician to the East London Children's Hospital, and to the Victoria Park Hospital for Diseases of the Chest; 15, Queen Anne street, Cavendish square.

1866 SMITH, HEYWOOD, M.A. M.D., 18, Harley street, Cavendish square.

1886 SMITH, HOWARD LYON, High street, Tring, Herts.

1885 SMITH, JAMES GREIG, M.B., C.M., F.R.S.Ed., Surgeon to the Bristol Royal Infirmary; 16, Victoria square, Clifton, Bristol.

1872 SMITH, T. GILBART, M.A., M.D., Assistant-Physician to the London Hospital; Physician to the Royal Hospital for Diseases of the Chest, City road; 68, Harley street, Cavendish square. *Trans.* 1.

1838 †SMITH, SPENCER, Consulting Surgeon to St. Mary's Hospital; 92, Oxford terrace, Hyde Park. C. 1854. S. 1855-8. V.P. 1859-60. T. 1865. *Referee*, 1851-3, 1862-4, 1866-78. *Lib. Com.* 1847.

1863 SMITH, THOMAS, *Vice-President*, Surgeon to, and Lecturer on Clinical Surgery at, St. Bartholomew's Hospital; 5, Stratford place, Oxford street. S. 1870-2. C. 1875-6. V.P. 1887-8. *Referee*, 1873-4, 1880-6. *Sci. Com.* 1867. *Trans.* 4.

1873 SMITH, W. JOHNSON, Surgeon to the Seamen's Hospital, Greenwich.

1874 *SMITH, WILLIAM ROBERT, M.D., D.Sc., F.R.S.Ed., Professor of Forensic Medicine at King's College, London; 74, Great Russell Street, Bloomsbury. *Trans.* 1.

1868 SOLLY, SAMUEL EDWIN, Colorado Springs, Colorado, U.S.

1865 SOUTHEY, REGINALD, M.D., Commissioner in Lunacy; 32, Grosvenor road, Westminster. C. 1881-2. S. 1883. *Referee*, 1873-80. *Trans.* 1.

1844 SPACKMAN, FREDERICK ROBERT, M.D., Consulting Physician to St. Alban's Hospital, Harpenden, St. Alban's.

Elected

1887 SPENCER, WALTER GEORGE, M.B., Assistant Surgeon to the Westminster Hospital; 94, Wimpole street, Cavendish square.

1888 SPICER, ROBERT HENRY SCANES, M.D., Physician to the Department for Diseases of the Throat, St. Mary's Hospital; 28, Welbeck street, Cavendish square.

1875 SPITTA, EDMUND JOHNSON, Ivy House, Clapham Common, Surrey.

1851 †SPITTA, ROBERT JOHN, M.D., East Side, Clapham Common, Surrey. C. 1878-9. *Trans.* 1.

1885 SQUIRE, JOHN EDWARD, M.D., Physician to the North London Hospital for Consumption; 23, Seymour street, Portman square. *Trans.* 1.

1882 STEAVENSON, WILLIAM EDWARD, M.D., Electrician to St. Bartholomew's Hospital; Physician to the Alexandra Hospital for Children; 39, Welbeck street, Cavendish square.

1854 STEVENS, HENRY, M.D., Inspector, Medical Department, Local Government Board, Whitehall; Mitcham House, Mitcham, Surrey.

1884 STEWART, EDWARD, M.D., 8, Upper Wimpole street, Cavendish square.

1859 STEWART, WILLIAM EDWARD, 16, Harley street, Cavendish square.

1879 *STIRLING, EDWARD CHARLES, late Assistant Surgeon and Lecturer on Physiology at St. George's Hospital; Adelaide, South Australia [care of T. Gemmell, Esq., 11, Essex street, Strand].

1856 †STOCKER, ALONZO HENRY, M.D., Peckham House, Peckham.

1865 STOKES, SIR WILLIAM, M.D., M.C., Surgeon to the Meath Hospital; 5, Merrion square north, Dublin. *Trans.* 1.

1884 STONHAM, CHARLES, Assistant Surgeon to the Westminster Hospital, and Curator of Anatomical Museum, University College, London; 62, Welbeck street, Cavendish square.

Elected

1843 STORKS, ROBERT REEVE, Paris.

1871 STRONG, HENRY JOHN, M.D., Surgeon to the Croydon General Hospital; Whitgift House, George street, Croydon.

1863 †STURGES, OCTAVIUS, M.D., Physician to, and Lecturer on Medicine at, the Westminster Hospital; Physician to the Hospital for Sick Children; 85, Wimpole street, Cavendish square. C. 1878-9. V.P. 1889. *Referee*, 1882-8.

1871 †SUTHERLAND, HENRY, M.D., Lecturer on Insanity at the Westminster Hospital; 6, Richmond terrace, Whitehall.

1871 SUTTON, HENRY GAWEN, M.B., Physician to, and Lecturer on Pathology at, the London Hospital; 9, Finsbury square. *Referee*, 1888. *Trans.* 1.

1883 SUTTON, JOHN BLAND, Assistant Surgeon, Lecturer on Comparative Anatomy, and Senior Demonstrator of Anatomy to the Middlesex Hospital; 48, Queen Anne street, Cavendish square. *Trans.* 4.

1886 SYMONDS, CHARTERS JAMES, M.S., Assistant Surgeon to Guy's Hospital; 26, Weymouth street, Portland place.

1878 *SYMPSON, THOMAS, Surgeon to the Lincoln County Hospital; 3, James street, Lincoln.

1870 TAIT, LAWSON, Surgeon to the Birmingham and Midland Hospital for Women; 7, The Crescent, Birmingham. *Trans.* 4.

1864 TAUSSIG, GABRIEL, M.D., 70, Piazza Barberini, Rome.

1875 TAY, WAREN, Surgeon to the London Hospital, to the Royal London Ophthalmic Hospital, to the North Eastern Hospital for Children, and to the Hospital for Skin Diseases, Blackfriars; 4, Finsbury square.

1873 TAYLOR, FREDERICK, M.D., *Secretary;* Physician to, and Lecturer on Medicine at, Guy's Hospital; Physician to the Evelina Hospital for Sick Children; 11, St. Thomas's street, Southwark. S. 1889. *Sci. Com.* 1889. *Referee*, 1887-8. *Trans.* 1.

Elected

1845 †TAYLOR, THOMAS, Warwick House, 1, Warwick place, Grove End road, St. John's Wood.

1886 TEALE, THOMAS PRIDGIN, M.B., F.R.S., Consulting Surgeon to the Leeds General Infirmary; 38, Cookridge street, Leeds.

1859 TEGART, EDWARD, 49, Jermyn street, St. James's. C. 1888-9.

1874 THIN, GEORGE, M.D., 22, Queen Anne street, Cavendish square. *Trans.* 9.

1862 THOMPSON, EDMUND SYMES, M.D., Senior Physician to the Hospital for Consumption, Brompton; Gresham Professor of Medicine; 33, Cavendish square. S. 1871-4. C. 1878-9. *Sci. Com.* 1889. *Referee*, 1876-7. *Trans.* 1.

1852 †THOMPSON, SIR HENRY, *Vice-President*, Surgeon-Extraordinary to H.M. the King of the Belgians; Emeritus Professor of Clinical Surgery in University College, London; and Consulting Surgeon to University College Hospital; Member of the "Société de Chirurgie," Paris; 35, Wimpole street, Cavendish square. C. 1869. *Trans.* 7.

1862 THOMPSON, REGINALD EDWARD, M.D., Physician to the Hospital for Consumption, Brompton; 47, Park street, Grosvenor square. C. 1879. S. 1880-82. V.P. 1883-4. *Referee*, 1873-8. *Sci. Com.* 1867. *Trans.* 2.

1881 THOMSON, WILLIAM SINCLAIR, M.D., late Senior Consulting Surgeon to Peterbro' Hospital, and Medical Officer of Health for Peterbro'; 1, Palace court, Notting Hill gate.

1876 THORNTON, JOHN KNOWSLEY, M.B., C.M., Surgeon to the Samaritan Free Hospital for Women and Children; 22, Portman street, Portman square. *Lib. Com.* 1886-8. *Trans.* 5.

1885 THURSFIELD, THOMAS WILLIAM, M.D., Physician to the Warneford and South Warwickshire General Hospital; 26, The Parade, Leamington.

1848 †TILT, EDWARD JOHN, M.D., Consulting Physician to the Farringdon General Dispensary and Lying-in Charity; 27, Seymour street, Portman square. *Referee*, 1874-81.

Elected

1880 TIVY, WILLIAM JAMES, 8, Lansdowne place, Clifton, Bristol.

1872 TOMES, CHARLES SISSMORE, M.A., F.R.S., 37, Cavendish square. C. 1887. *Lib. Com.* 1879.

1867 TONGE, MORRIS, M.D., Harrow-on-the-Hill, Middlesex.

1882 TOOTH, HOWARD HENRY, M.D., Assistant Medical Tutor St. Bartholomew's Hospital; 34, Harley street, Cavendish square.

1871 *TREND, THEOPHILUS W., M.D., Raeberry Lodge, Southampton.

1879 TREVES, FREDERICK, Surgeon to, and Lecturer on Anatomy at, the London Hospital; 6, Wimpole street, Cavendish square. *Sci. Com.* 1889. *Trans.* 5.

1881 *TREVES, WILLIAM KNIGHT, Surgeon to the National Hospital for Scrofula; 31, Dalby square, Cliftonville, Margate.

1867 TROTTER, JOHN WILLIAM, late Surgeon-Major, Coldstream Guards; 4, St. Peter's terrace, York.

1859 TRUMAN, EDWIN THOMAS, Surgeon-Dentist in Ordinary to Her Majesty's Household; 23, Old Burlington street.

1889 TURNBULL, GEORGE LINDSAY, M.B.

1875 TURNER, FRANCIS CHARLEWOOD, M.A., M.D., Physician to the North-Eastern Hospital for Children, and to the London Hospital; 15, Finsbury square.

1873 TURNER, GEORGE BROWN, M.D., Vernon House, Ryde, Isle of Wight.

1882 TURNER, GEORGE ROBERTSON, Visiting Surgeon to the Seamen's Hospital, Greenwich; Assistant Surgeon to, and Joint Lecturer on Practical Surgery at, St. George's Hospital; 49, Green street, Park lane.

1888 TYLDEN, HENRY JOHN, M.B., 38, Harewood square.

1881 TYSON, WILLIAM JOSEPH, M.D., Medical Officer of the Folkestone Infirmary; 10, Langhorne Gardens, Folkestone.

Elected

1876 VENN, ALBERT JOHN, M.D., Obstetric Physician to the Metropolitan Free Hospital; Physician to the Victoria Hospital for Children, Chelsea; and Assistant Physician for the Diseases of Women, West London Hospital; 27, George street, Hanover square.

1870 VENNING, EDGCOMBE, 30, Cadogan place.

1865 VERNON, BOWATER JOHN, Ophthalmic Surgeon to St. Bartholomew's Hospital and to the West London Hospital; 14, Clarges street, Piccadilly.

1867 VINTRAS, ACHILLE, M.D., Physician to the French Embassy, and to the French Hospital, Leicester place; 19A, Hanover square.

1828 VULPES, BENEDETTO, M.D., Physician to the Hospital of Aversa, and the Hospital of Incurables, Naples.

1854 WADDINGTON, EDWARD, Hamilton, Auckland, New Zealand.

1886 WAINEWRIGHT, BENJAMIN, M.B., C.M., 42, Dover Street, Piccadilly.

1864 WAITE, CHARLES DERBY, M.B., Consulting Physician to the Westminster General Dispensary; 3, Old Burlington street.

1884 WAKLEY, Thomas, jun., 5, Queen's Gate, South Kensington.

1868 *WALKER, ROBERT, Honorary Surgeon to the Carlisle Dispensary; 2, Portland square, Carlisle.

1887 WALLACE, EDWARD JAMES, M.D., Holmbush, Grove road, Southsea.

1883 WALLER, AUGUSTUS, M.D., Lecturer on Physiology, St. Mary's Hospital; Weston Lodge, 16, Grove End road.

1888 WALLIS, FREDERICK CHARLES, M.B., B.C., 18, St. James's street.

1867 WALLIS, GEORGE, Surgeon to Addenbrooke's Hospital, Corpus Buildings, Cambridge.

1873 WALSHAM, WILLIAM JOHNSON, C.M., Assistant Surgeon to, and Demonstrator of Practical and Orthopædic Surgery at, St. Bartholomew's Hospital; Surgeon to the Metropolitan Free Hospital; 27, Weymouth street, Portland place. C. 1888-9. *Lib. Com.* 1882-5. *Trans.* 5.

Elected

1852 †WALSHE, WALTER HAYLE, M.D., LL.D.Edin., Emeritus Professor of the Principles and Practice of Medicine, University College, London; Consulting Physician to the Hospital for Consumption and to University College Hospital; 41, Hyde Park square. C. 1872. *Trans.* 1.

1883 *WALTERS, JAMES HOPKINS, Senior Assistant Surgeon to the Royal Berkshire Hospital; 15, Friar street, Reading.

1886 WARD, ALLAN OGIER, M.D., 1, Brook place, Lower Tottenham.

1821 WARD, WILLIAM TILLEARD, Tilleards, Stanhope, Canada.

1846 WARE, JAMES THOMAS, Tilford House, near Farnham, Surrey.

1866 WARING, EDWARD JOHN, C.I.E., M.D., 49, Clifton Gardens, Maida vale. *Referee*, 1881-5.

1877 WARNER, FRANCIS, M.D., Assistant Physician and Lecturer on Botany to the London Hospital; 5, Prince of Wales Terrace, Kensington Palace. *Trans.* 1.

1889 WASHBOURN, JOHN WYCHENFORD, M.D, 24, Maze Pond, Borough.

1861 WATERS, A. T. HOUGHTON, M.D., Physician to the Royal Infirmary; 69, Bedford street, Liverpool. *Trans.* 3.

1879 WATERS, JOHN HENRY, M.D., C.M., 101, Jermyn street.

1861 †WATSON, WILLIAM SPENCER, M.B., Surgeon to the Great Northern Hospital; Surgeon to the Royal South London Ophthalmic Hospital; 7, Henrietta street, Cavendish square. C. 1883-4. *Trans.* 1.

1879 DE WATTEVILLE, ARMAND, M.A., M.D., B.Sc., Physician in Charge of the Electro-therapeutical Department at St. Mary's Hospital; 30, Welbeck street, Cavendish square.

1854 WEBB, WILLIAM, M.D., Gilkin View House, Wirksworth, Derbyshire.

Elected

1840 WEBB, WILLIAM WOODHAM, M.D., Neuilly-sur-Seine, France.

1857 WEBER, HERMANN, M.D., Physician to the German Hospital; 10, Grosvenor street, Grosvenor square. C. 1874-5. V.P. 1885-6. *Sci. Com.* 1889. *Referee*, 1869-73, 1878-84. *Lib. Com.* 1864-73. *Trans.* 6.

1844 †WEGG, WILLIAM, M.D., 15, Hertford street, Mayfair. L. 1854-8. C. 1861-2. T. 1873-80. *Lib. Com.* 1851-3.

1878 WEISS, HUBERT FOVEAUX, Assistant Surgeon to the West London Hospital; 11, Hanover square.

1874 WELLS, HARRY, M.D., San Ysidro, Buenos Ayres, S. America.

1854 †WELLS, SIR THOMAS SPENCER, Bart., Surgeon-in-Ordinary to H.M.'s Household; Consulting Surgeon to the Samaritan Free Hospital for Women and Children; Corresponding Member, "Académie de Médecine," Paris; 3, Upper Grosvenor street. C. 1870. V.P. 1881. *Trans.* 14. *Pro.* 1.

1842 †WEST, CHARLES, M.D., Corresponding Member of the Academy of Medicine of Paris; 55, Harley street, Cavendish square. C. 1855-6. V.P. 1863. P. 1877-8. *Referee*, 1848-54, 1857-62, 1864-76, 1880. *Sci. Com.* 1863. *Lib. Com.* 1844-7, 1851. *Trans.* 2.

1877 WEST, SAMUEL, M.D., Assistant Physician to St. Bartholomew's Hospital; Physician to the City of London Hospital for Diseases of the Chest, Victoria Park, and to the Royal Free Hospital; 15, Wimpole street, Cavendish square. *Trans.* 4.

1888 WETHERED, FRANK JOSEPH, M.B., 34, Queen Anne street, Cavendish square.

1882 WHARRY, CHARLES JOHN, M.D.

1881 WHARRY, ROBERT, M.D., Physician to the Westminster Dispensary; 6, Gordon square.

1878 WHARTON, HENRY THORNTON, M.A., Honorary Surgeon to the Kilburn Dispensary; 39, St. George's road, Kilburn.

Elected

1828 WHATLEY, JOHN, M.D.

1875 WHIPHAM, THOMAS TILLYER, M.B., Physician to, and Lecturer on Pathology and Practical Medicine at, St. George's Hospital; 11, Grosvenor street, Grosvenor square.

1849 WHITE, JOHN.

1881 WHITE, WILLIAM HALE, M.D., Senior Assistant Physician to, and Lecturer on Materia Medica at, Guy's Hospital; 65, Harley street, Cavendish square. *Referee*, 1888. *Trans.* 2.

1881 *WHITEHEAD, WALTER, F.R.S. Ed., Surgeon to the Manchester Royal Infirmary; Senior Surgeon to the Manchester and Salford Lock and Skin Hospital; 24, St. Ann's square, Manchester. *Trans.* 1.

1885 *WHITLA, WILLIAM, M.D., Physician to, and Lecturer in Medicine at, the Belfast Royal Hospital; Consulting Physician to the Ulster Hospital for Women and Children; 8, College square north, Belfast.

1877 WHITMORE, WILLIAM TICKLE, Surgeon to the Westminster General Dispensary; 7, Arlington street, Piccadilly.

1852 WIBLIN, JOHN, M.D., Medical Inspector of Emigrants and Recruits; Southampton. *Trans.* 1.

1870 *WILKIN, JOHN F., M.D., M.C., The Warren, Beckenham park, Kent.

1883 *WILKINSON, THOMAS MARSHALL, Surgeon to the Lincoln County Hospital and to the Lincoln General Dispensary; 7, Lindum road, Lincoln.

1837 WILKS, GEORGE AUGUSTUS FREDERICK, M.D., Stanbury, Torquay.

1863 WILKS, SAMUEL, M.D., LL.D., F.R.S., Physician in Ordinary to their Royal Highnesses the Duke and Duchess of Connaught, and to H.R.H. the Duke of Edinburgh; Consulting Physician to Guy's Hospital, and Member of the Senate of the University of London; 72, Grosvenor street, Grosvenor square. *Referee*, 1872-81. *Sci. Com.* 1.

Elected

1883 *WILLANS, WILLIAM BLUNDELL, Great Hadham, Herts.

1865 †WILLETT, ALFRED, Surgeon to St. Bartholomew's Hospital; Surgeon to St. Luke's Hospital; 36, Wimpole street, Cavendish square. C. 1880-81. *Referee*, 1882-8. *Trans.* 2.

1887 WILLETT, EDGAR WILLIAM, M.B., 60, Welbeck street, Cavendish square.

1864 WILLETT, EDMUND SPARSHALL, M.D., Resident Physician, Wyke House, Isleworth, Middlesex.

1888 WILLIAMS, CAMPBELL, 62, Welbeck street, Cavendish square.

1859 *WILLIAMS, CHARLES, Surgeon to the Norfolk and Norwich Hospital; 48, Prince of Wales road, Norwich.

1866 WILLIAMS, CHARLES THEODORE, M.A., M.D., Physician to the Hospital for Consumption and Diseases of the Chest, Brompton; 2, Upper Brook street, Grosvenor square. C. 1884-5. *Referee*, 1888. *Lib. Com.* 1880-3. *Trans.* 5.

1881 WILLIAMS, DAWSON, M.D., Assistant Physician to the East London Hospital for Children; 25, Old Burlington street.

1872 WILLIAMS, JOHN, M.D., Physician Accoucheur to H.R.H. the Princess Beatrice; Professor of Midwifery, University College, London; Obstetric Physician to University College Hospital; 11, Queen Anne street, Cavendish square. *Referee*, 1878-88. *Lib. Com.* 1876-82.

1868 WILLIAMS, WILLIAM RHYS, M.D., 95, St. George's road, Pimlico.

1887 WILSON, ARTHUR HERVEY, M.D., 504, Broadway, Boston, U.S.A.

1889 WILSON, JOHN HENRY PARKER, The Avenue, Brixton Hill.

1863 WILSON, ROBERT JAMES, 7, Warrior square, St. Leonard's-on-Sea, Sussex.

1889 WISE, A. TUCKER, M.D., Kursaal de la Maloja.

1850 *WISE, ROBERT STANTON, M.D., Consulting Physician to the Southam Eye and Ear Infirmary; Beech Lawn, Banbury.

Elected

1879 WOAKES, EDWARD, M.D., Senior Aural Surgeon to the London Hospital; 78, Harley street, Cavendish square.

1885 WOLFENDEN, RICHARD NORRIS, M.D., Assistant Physician to the North-West London Hospital; 19, Upper Wimpole street.

1851 †WOOD, JOHN, F.R.S., 61, Wimpole street, Cavendish square. C. 1867-8. V.P. 1877-8. *Referee*, 1871-6, 1880-88. *Lib. Com.* 1866. *Trans.* 3.

1887 WOOD, THOMAS OUTTERSON, M.D., 40, Margaret street, Cavendish square.

1848 †WOOD, WILLIAM, M.D., Physician to St. Luke's Hospital for Lunatics; 99, Harley street, Cavendish square. C. 1867-8. V.P. 1877-8.

1883 WOOD, WILLIAM EDWARD RAMSDEN, M.A., M.D., The Priory, Roehampton.

1879 WOODWARD, G. P. M., M.D., Deputy Surgeon-General; Sydney, New South Wales.

[It is particularly requested that any change of Title, Appointment, or Residence, may be communicated to the Hon. Secretaries before the 1st of September in each year, in order that the List may be made as correct as possible.]

LIST OF RESIDENT FELLOWS

ARRANGED ACCORDING TO

DATE OF ELECTION.

1833 Thomas A. Barker, M.D.
1836 Alexander Shaw.
1838 Charles Hawkins.
Henry Spencer Smith.
1839 T. Graham Balfour, M.D., F.R.S.
Fred. Le Gros Clark, F.R.S.
James Dixon.
1840 Samuel A. Lane.
Sir James Paget, Bt., F.R.S.
1841 Sir Henry A. Pitman, M.D.
Sir William Bowman, Bart., F.R.S.
Paul Jackson.
1842 Charles West, M.D.
Sir John Simon, K.C.B., F.R.S.
John Erichsen F.R.S.
Sir Oscar M. P. Clayton, C.M.G.
1843 Sir Prescott G. Hewett, Bt., F.R.S.
Henry Lee.
Luther Holden.
Edward Newton.
1844 William Wegg, M.D.
Edwin Humby.
1845 Samuel Cartwright.
George D. Pollock.
Thomas Taylor.
Sir Edwin Saunders.
Edward U. Berry.
1846 John A. Bostock.
Barnard Wight Holt.
Carsten Holthouse.
1847 George Johnson, M.D., F.R.S.
1848 Sir Edward H. Sieveking, M.D.
Edward Ballard, M.D., F.R.S.
William Wood, M.D.
1848 Thomas Hawksley, M.D.
Edward John Tilt, M.D.
John Clarke, M.D.
John Gregory Forbes.
1849 Hugh J. Sanderson, M.D.
C. H. F. Routh, M.D.
Edmund L. Birkett, M.D.
George T. Fincham, M.D.
Sir William W. Gull, Bt., M.D., F.R.S.
1850 Richard Quain, M.D., F.R.S
1851 Sir Wm Jenner, Bt., M.D., F.R.S
John Birkett.
John A. Kingdon.
Peter Y. Gowlland.
John Marshall, F.R.S.
John Wood, F.R.S.
Bernard E. Brodhurst.
Robert J. Spitta, M.D.
1852 Walter H. Walshe, M.D.
William Adams.
Sir Henry Thompson.
1853 Robert Brudenell Carter.
1854 Sir Alfred Baring Garrod, M.D., F.R.S.
Sir Thomas Spencer Wells, Bt.
1855 W. M. Graily Hewitt, M.D.
J. Burdon Sanderson, M.D., F.R.S.
J. Russell Reynolds, M.D., F.R.S.
William Marcet, M.D., F.R.S.
1856 Charles J. Hare, M.D.
William Bird.
Jonathan Hutchinson, F.R.S.
Timothy Holmes.

1856 Alonzo H. Stocker, M.D.
1857 William Overend Priestley, M.D.
George Harley, M.D., F.R.S.
Hermann Weber, M.D.
John Whitaker Hulke, F.R.S.
John Morgan.
Henry Cooper Rose, M.D.
Henry Walter Kiallmark.
1858 Fred. George Reed, M.D.
John William Ogle, M.D.
1859 Wm. Howship Dickinson, M.D.
William Scovell Savory, F.R.S.
Edwin Thomas Truman.
Richard Barwell.
Edward Tegart.
Septimus William Sibley.
William E. Stewart.
1860 Sir Andrew Clark, Bt., M.D., F.R.S.
William Ogle, M.D.
Thomas Bryant.
John Couper.
Henry Howard Hayward.
1861 Robert Barnes, M.D.
William Spencer Watson.
William Henry Holman, M.B.
1862 James Andrew, M.D.
Lionel Smith Beale, M.B., F.R.S.
Edmund Symes Thompson, M.D.
Reginald Edward Thompson, M.D.
William Henry Brace, M.D.
George Cowell.
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Cuthbert Hilton Golding-Bird, M.S.
Benjamin Wainewright, M.B., C.M.
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Lauriston Elgie Shaw, M.D.
Charters James Symonds, M.S.
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Allan Ogier Ward, M.D.
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Hugh Percy Dunn.
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Harry Scott, M.D.
James Barry Ball, M.D.
Gilbert Richardson, M.D.
Edward James Wallace, M.D.
D'Arcy Power, M.B.
Walter Pearce, M.D.
John Gay.
Edward John Sidebotham, M.B.
Frederick St. George Mivart.
Charles Joseph Arkle, M.B.
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Percy J. F. Lush, M.B.

1888 Robert Henry Scanes Spicer, M.D.
Jonathan Hutchinson, Jun.
Campbell Williams.
Walter Baugh Hadden, M.D.
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Laurie Asher Lawrence.
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Arthur Symons Eccles, M.B.
Frank Joseph Wethered, M.B.
Edmund Wilkinson Roughton, M.D.
Edward Dillon Mapother, M.D.
Frederick William Cook, M.D.
John Phillips, M.B.
Robert Henry Clarke, M.B.

1889 Montagu Handfield-Jones, M.D.
Norman MacMillan MacLehose, M.B.
David Henry Goodsall.
Lawrence Trent Cumberbatch, M.D. (*deceased*).
Raymond Johnson, M.B.
Hugh Leslie Roberts, M.B.
John Fletcher Little, M.B.
Henry Work Dodd.
W. H. Rivers Rivers, M.D.
Sir William Roberts, M.D., F.R.S.
Sidney Phillips, M.D.
Ernest le Cronin Lancaster, M.B.
William Charles Bull, M.B.
George P. Field.
Francis Horatio Napier.
John Wychenford Washbourne, M.D.
John Henry Parker Wilson.
Francis William Humphery, M.A., M.B.

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Regulations relative to the publication of the 'Proceedings of the Society.'

The 'Proceedings' are issued after each Meeting.

They are sent, postage free, to every Fellow of the Society who expresses a wish to receive them.

They may be had by others at the Society's House, on payment (in advance) of an annual subscription of five shillings and eightpence, which may be sent either by post-office order or in postage-stamps;—this will include the expense of conveyance by post to any place within the Postal Union. For places beyond the Postal Union special arrangements must be made.

A notice of every paper will appear in the 'Proceedings.' Authors will be at liberty, on sending their communications, to intimate to the Secretaries whether they wish them to appear in the 'Proceedings' *only*, or in the 'Proceedings' and 'Transactions;' and in all cases they must furnish an Abstract of the communication.

The Abstracts of the papers read are sent to the Journals as heretofore.

ADVERTISEMENT.

THE Council of the Royal Medical and Chirurgical Society deems it proper to state that the Society does not hold itself in any way responsible for the statements, reasonings, or opinions set forth in the various papers which, on grounds of general merit, are thought worthy of being published in its 'Transactions.'

ANNUAL REPORT OF THE COUNCIL, 1888-9,

With the Proceedings of the Annual Meeting, Friday, March 1st, 1889.

Sir Edward H. Sieveking, M.D., President, in the Chair.

The President and Council have the satisfaction of being able again to congratulate the Fellows of the Society on the maintenance of a condition of financial prosperity and scientific activity.

The volume of 'Transactions' shows the papers contributed to have been of high interest, and their reading gave rise to numerous interesting and instructive discussions.

With the view of enabling the Fellows to read the discussions while the subject of the paper is still fresh in the memory, the Council decided to print the 'Proceedings' immediately after each meeting, and to send a copy, postage free, to every Fellow of the Society who expresses a wish to receive it. To each number of the 'Proceedings' has also been added the title of the paper or papers to be read at the ensuing meeting.

It is hoped that by this alteration in the method of issue the 'Proceedings' will be rendered of more use and interest to the Fellows than when published, as formerly, at longer intervals.

The number of subscriptions received during the past year was 358, and 2 composition fees have been paid. Twenty-two new Fellows have been elected, of whom 20

are resident, and 2 non-resident; 1 Resident Fellow has become non-resident, and 5 Fellows have resigned their connection with the Society.

The Society has lost 11 of its Fellows by death. The total number of Fellows at the present time is 769.

Particulars of the income and expenditure of the Society are set forth in the accompanying Balance Sheet. From this it will be seen that there is a balance in favour of the Society of £373 2*s*. 3*d*.

Part of this balance is due to the reduction which has been made in the cost of the 'Transactions' and 'Proceedings,' owing to the improvements suggested and carried out by the Resident Librarian.

The plan suggested by the Treasurers, and referred to in the last Report of the Council, namely, than in future the statement of accounts should show the receipts and disbursements of the Society from January 1st to December 31st of each year, has been rigidly carried out for the year 1888. Formerly some of the accounts for any given year were paid in the early part of the subsequent one, and yet were debited to the previous year. Hence, some accounts which were due in 1887, and which *have been paid in the past year* (1888), would, under the old system, have appeared as if paid in 1887; but as the sums in question have actually been paid in 1888, they are included in the present statement, which makes the amount of expenditure seem greater than would otherwise have been the case. On the other hand, from circumstances beyond the control of the Treasurers, the last half-year's dividend (£45 3*s*.) on the stock belonging to the Society, was not received before the end of December, and though it has since been paid in, does not appear on the credit side of the account. This circumstance makes the balance in hand at the end of the year less than it would otherwise have been (viz. £418 5*s*. 3*d*.), though, as it stands, it is a very satisfactory amount. But even if this had not been the case, it is felt that the plan now adopted is financially a sound one; and in future the annual statements will not only nominally

but actually show the receipts and disbursements of the Society for each year from January 1st to December 31st.

The Hon. Librarians report as follows:

"During the past year 578 volumes have been added to the Library, exclusive of Transactions, journals, and other periodical publications. Of these additions 252 were obtained by purchase, and 326 by donation. The total number of volumes now in the Library is 31,320.

"The Library was open on 276 days; the number of visits paid by Fellows was 4274, and 3883 books were lent out.

"By donation and purchase 56 new portraits of medical men have been added to the Society's collection.

"It is a great satisfaction to us to be able to record that the Resident Librarian, Mr. Mac Alister, has carried out the work of the Library in a manner to command our entire satisfaction."

This being the fifteenth year since the foundation of the Marshall Hall Prize, the time had arrived for making the award for the third time.

The Council, on the recommendation of a Committee appointed for the purpose, selected Dr. Walter Holbrook Gaskell, F.R.S., Lecturer in Advanced Physiology in the University of Cambridge, as the recipient of the Prize, in consideration of his valuable researches in connection with the nervous system, carried out during the past five years. Dr. Gaskell, at the invitation of the Council, delivered an address, describing some of his investigations and their results. This is published in the volume of 'Transactions.'

The Treasurers' audited statement of accounts (see pp. xciv and xcv) was taken as read.

Dr. Barnes remarked that the Report was brief, but eminently satisfactory. The Library was the most useful

and successful medical library in London; the books were of enormous value to the profession, and he would congratulate the President and Council on the extent of last year's progress. He had pleasure in moving:

> "That the Report of the President and Council, together with the Treasurers' audited statement of accounts, be adopted and published in the next volume of 'Transactions.'

Dr. THEODORE WILLIAMS, in seconding the motion, expressed the pleasure he had felt in listening to the Report. He thought the Council had done very wisely in changing the mode of issuing the 'Proceedings.' It was much better to have them issued immediately after the discussions, instead of having to wait some time for them. He was glad to see that they had elected twenty-two new Fellows, especially in view of the proposal afoot for the purchase of new premises. It seemed to him that their subscription income ought to be increased very largely, because to have only 358 *subscribing* Fellows out of a total of 769 did not seem to him to be quite the proper position for the Society. There was no doubt that they ought to have a house fitted in every way for their purposes.

The motion was carried unanimously.

Dr. HARE observed that the Fellows were no doubt aware that non-resident Fellows were entitled to obtain the 'Transactions' during life by a composition payment of six guineas. Now the Council were very desirous that non-resident Fellows should have every possible advantage, but, so far, they had been having this particular advantage at the cost of the resident Fellows, which was scarcely fair. This sum of six guineas did not cover the bare cost of the average number of volumes given in return for that payment. He had, therefore, to move the following resolution, which would have the effect of raising the composition fee for 'Transactions' from six guineas to eight guineas:

"That in Bye-Law, Chap. xiv, Sect. 3, the word 'eight' be substituted for the word 'six.'"

Dr. CHEADLE seconded the motion, and remarked that the change proposed was a very necessary one. The charge of six guineas, which had been fixed as the composition fee for the 'Transactions' to non-resident Fellows, was settled a great many years ago, when the cost of production was less and the volume very much smaller than at present. For years past they had been issuing the volumes to non-resident Fellows at a considerable loss.

The PRESIDENT then delivered his annual address. (See p. 1).

Dr. R. L. BOWLES remarked that the earlier portion of the address had a melancholy interest for all of them, but it bore evidence of work of which all of them must be proud. All those referred to had done their duty in their respective spheres. The latter part of the address was more hopeful. They had been told how they were growing—so much, indeed, that they had almost grown out of their clothes. They required more room for their books, and he hoped that they would all put their shoulders to the wheel and assist the Council. Their President had also expressed a hope that they might do more than they had done, and he was at one with him on that point. There was one subject in which he had taken great interest for thirty-three years past, viz., the subject of drowning and suspended animation. He would like to say a few words on that topic if the Society were not tired of it. He hoped some steps would be taken to form a committee to reconsider the former decision of the Society. He thought it was necessary for the honour of the Society; which had assumed a very great responsibility. They had been told that it was the water introduced into the lungs, and the effects produced thereby, that caused death in drowning. It was found that the Sylvester method of respiration introduced more air into the lungs than the Marshall Hall method, and on that ground it was recom-

mended for use. But they were not told how they were to get rid of the water in the lungs. Since that time he had never failed to protest against it as being altogether wrong, to introduce air into lungs filled with water; in fact it was a pernicious practice. He had found that the Royal Humane Society had fathered the Society with the responsibility for their procedure, and plainly stated that their system was "approved by the Royal Medical and Chirurgical Society." Such bodies as that looked to them for advice and assistance; they were looking for it now and were anxious that the question should be finally settled. Therefore he entirely endorsed the President's remarks on the importance of special committees, and hoped that they would be carried out. He agreed that they were equally applicable to balneology and climatology. He concluded by asking them to vote :—

> "That the best thanks of the Society be given to the President for his annual address, and that he be requested to allow it to be printed in the forthcoming volume of 'Transactions.'"

Dr. MAPOTHER, in seconding the motion, expressed his sense of the honour conferred on him, so recently elected a Fellow of the Society, in being requested to second that resolution. Any hesitation he might have had at the beginning of the meeting was entirely removed while listening to the President's admirable address; but he would content himself with endorsing the remarks of the proposer.

The PRESIDENT, in reply, sincerely hoped the Society might do much greater things than they had hitherto done—not individually, for that would probably be impossible, but collectively, in which capacity he thought it was possible to effect more. He would willingly place his address at the disposal of the Society.

Dr. QUAIN said that the duties of the Vice-Presidents during the past year had been almost honorary, for the President had been so assiduous in his attendance that he

left little or nothing for them to do. He asked the members to speed the parting guests, as they welcomed the coming ones. He suggested that it would have been well if the Council had given them some fuller information as to the proposed purchase of new premises, before the special meeting on Monday next, which had been summoned to decide the question. He had great pleasure in moving :—

> "That the best thanks of the Society be given to the retiring Vice-Presidents—Sir Andrew Clark, Bart., Dr. James Andrew, Sir Henry Thompson, and Mr. Thomas Smith; and to the other retiring members of Council—Dr. Cayley, Sir Joseph Fayrer, Dr. Douglas Powell, Dr. Sansom, and Mr. Henry T. Butlin."

Dr. F. De Havilland Hall seconded the resolution.

The President asked to be allowed, before putting the resolution, to state that nobody regretted more than he did the shortness of the notice concerning the meeting for Monday next; but it would be fully explained on Monday why they had been obliged to act in the way they had, or else throw over the whole project. The suggestion thrown out by Dr. Quain had already been attended to, and they would have all the information that was possible on the day following.

The resolution was agreed to unanimously.

Dr. Gee observed that it was hardly customary for one member of the Council to propose a vote of thanks to a colleague, but it was peculiarly fitting on this occasion, as no one could know better than their honorary librarians how much time and energy Dr. Cheadle had devoted to his duties. Not only himself, but everyone interested in the business of the Society, knew that in the hands of his old friend, Dr. Cheadle, the post of secretary was no sinecure. He had the greatest possible pleasure in moving :—

> "That the Society desires to offer to Dr. Cheadle, the retiring honorary secretary, its very hearty

thanks for the zeal and ability of his valuable services during a term of three years."

Mr. COWELL said he had great pleasure in seconding the resolution. The Vice-Presidents of the Society were comparatively ornamental, but the honorary secretary was an officer with arduous duties to perform, and after the President, was, he thought, the most important officer. Dr. Cheadle—who did his work, as everyone could testify, with exemplary care and attention—adorned every post he had held, and he (the speaker) was quite sure that Dr. Cheadle had held that post for the last three years to the great benefit of the Society.

The resolution was carried by acclamation.

Dr. CHEADLE, in reply, thanked the Society for the kind way in which they had proposed and received the vote of thanks to himself. He could truly say he had had the progress of the Society at heart, and had done everything in his power to foster its interests. He, however, felt himself compelled to say that the most difficult part of the work was done, not by the secretaries, but by the resident librarian, Mr. Mac Alister, to whom the thanks of the Society were due. The improvements that had been referred to as having been originated since he had taken office, especially the diminished cost of the 'Transactions,' and the immediate issue of the 'Proceedings,' instead of, as in the past, at intervals of three or four months when their interest had become stale, were due to Mr. Mac Alister. All the merit the honorary secretaries could claim was to have cordially assisted in carrying them out. There were other requirements which had begun to be felt more urgently of late, namely, a change to a better locality and to larger and more commodious rooms suited to their great institution. He hoped that they would be able to carry into effect the project that would be laid before them on Monday next; by doing so they would be making a great step in advance, which would enable all the Fellows to enjoy the advantages of the Society more completely

than they did at present. He would like to thank all his colleagues for the kind and cordial assistance they had given him throughout, without which his work would have been much less pleasant than it had been.

The PRESIDENT then announced the result of the ballot for Officers and Council for the year 1889-90, and the meeting terminated.

Abstract of Income and Expenditure for the Year ending December 31st, 1888.

Dr.					Cr.				
To Balance in hand on January 1st, 1888 ..			£203	17 11	By *House Rent, Taxes, &c.*—				
358 Annual Subscriptions at £3 3s. ..	£1127	14 0			Ground Rent (less tax)	£13	12 5		
29 Admission Fees at £6 6s.	182	14 0			Imperial Taxes	13	9 8		
1 Composition Fee for 'Transactions' ..	6	6 0			Parish Rates	18	1 0		
2 Life Composition Subscriptions	21	0 0			Water Rate	8	1 2		
Fines	0	3 6			Insurance	6	6 0		
			1337	17 6				£59	10 3
„ *Transactions, &c.*—					„ *Lighting and Heating*—				
Sale of Volume 70 by Messrs. Longmans	63	18 2			Gas	31	13 4		
„ Volume 47 at Berners Street ..	0	4 8			Chandler	9	18 10		
„ 'Proceedings' „ ..	1	4 8			Coal	32	0 0		
			65	7 6				73	12 2
„ *Contributions from Societies towards Expenses of Rooms*—					„ *Repairs, &c.*—				
Pathological Society	84	0 0			Repairs, Furniture, Cleaning, &c. ..			91	3 5
Clinical Society	78	15 0			„ *Meeting Expenses*—				
Obstetrical Society	46	4 0			Refreshments and Waiters at Meetings ..	18	1 10		
Society for Relief of Widows of Medical Men	30	0 0			Microscopes, Lamps, &c.	1	2 0		
			238	19 0				19	3 10
Interest—					„ *Stationery, Postage, &c.*—				
On Stock* (half year ending April 6th) ..	44	18 9			Stationery, Printing, &c.	24	10 0		
Bonus on Conversion of Stock	7	12 0			Postage and Receipt Stamps	25	15 0		
On Deposit at Bank	7	1 1			Cheques	0	8 4		
			59	11 10				50	13 4
					„ *Officers and Servants*—				
					Salaries and Wages			498	11 8
					„ *Library*—				
					English Books	102	15 10		
					Foreign ditto	190	4 2		
					Binding	56	10 8		
					Parcels	2	17 2		
								352	7 10
					„ *'Transactions' and 'Proceedings'*—				
					Volume 70, Printing, Binding, &c. ..	238	17 6		
					'Proceedings' (Session 1887-8)	88	1 0		
					Advertising and Longmans' Commission	11	0 7		
								332	19 1

* The dividends due for second half year were not paid to Treasurers until after December 31st, 1888, and therefore do not appear in the present Statement.

„ *Sundry Disbursements*—			
Legal Expenses			1 1 0
Cost of Transferring Stocks and Powers of Attorney			2 14 6
Life Subscriptions Invested			47 5 0
Petty Cash Payments			3 9 5
„ *Balance*—			
Balance at Bank (on Deposit £300) ..	326 13 10		
Subscriptions, &c., in hand, December 31st, 1888	24 17 2		
Petty cash in hand..	21 11 3		
		373 2 3	
		£1905 13 9	£1905 13 9

Audited and found correct, February 9th, 1889.

EDWARD TEGART. | FREDERICK TAYLOR.
WILLIAM H. BENNETT. | A. MARMADUKE SHEILD.
DAVID W. FINLAY. | ARTHUR E. BARKER.

J. WARRINGTON HAWARD, *Hon. Sec.*

CHARLES J. HARE, } *Treasurers.*
J. A. BOSTOCK, }

STOCK ACCOUNT.

Dr.			Cr.	
To amount of Stock, December 31st, 1887	£3040 4 4		By Stock standing in names of Trustees, December 31st, 1888..	£3085 16 1
„ Since purchased (at a cost of £47 5*s.*)	45 11 9			
	£3085 16 1			£3085 16 1

MARSHALL HALL FUND.

Dr.			Cr.	
To amount of Stock, December 31st, 1887		£678 17 7	By Sold to produce £90 14*s.* 9*d.*, being amount of Prize ..	£91 2 0
„ Dividends for 1888	£20 5 10		„ Stock standing in names of Trustees, December 31st, 1888	599 7 0
Less Expenses of Prize and Meeting	8 17 6			
Expended in Purchase of Stock ..	11 8 4	(Producing) 11 11 5		
		£690 9 0		£690 9 0

ADDRESS

OF

SIR EDWARD H. SIEVEKING, M.D.,

LL.D., F.R.C.P.,

PRESIDENT,

AT THE

ANNUAL MEETING, MARCH 1st, 1889.

Fellows of the Royal Medical and Chirurgical Society,—When I first took the Presidential Chair after the last Annual Meeting of our Society, I naturally felt prompted to express to you my appreciation of the honour you had conferred upon me, by placing me in this position, as well as my fear that I should only follow my predecessors, all of whom belong to the class of men that have helped to advance medical science, *haud passibus æquis*. The only point in which I claim to be equal to them is in my loyalty to you, and to our common professional interests. The custom of the Society forbad my expressing myself in this sense at the time, and you will, I hope, pardon me if I take this opportunity, before entering upon the special topics to which the Annual Presidential Address is ordinarily devoted, of tendering to you my best thanks for electing me to preside over your most interesting meetings, together with an expression of the hope that my conduct

in the Council and in the General Assemblies of the Society, has caused none of you to regret his vote in my behalf.

Thanks to the zeal of the Fellows, the traditions of the Society have, during the past year, been well maintained; and I have no fear of any criticisms that may be passed upon the work that has been performed, as evidenced by the 'Proceedings' and the 'Transactions.' Our numbers show a steady increase, while the attendances at the meetings, and the discussions to which the papers gave rise, have been extremely satisfactory. The Library forms a more and more attractive feature of our Society, while the convenience of our reading-room and the improvement in the ventilation, of which I can speak feelingly and from a painful recollection of its former condition, leave little to be desired. Whether any important alteration in our habitat can be made, is a question for which, later on, I shall have to ask your attention, as it is one which your Council have already had under serious consideration. I am confident that nothing that may add to the position and progress of the Society, and that our Treasurers can sanction, will at any time be neglected.

The first duty that we have now to perform is the sorrowful one of passing in review the losses that we have sustained by the sickle of the universal Reaper, and to pay a tribute of respect and affection to those who have preceded us to our eternal home.

As far as the Summer Session is concerned, the deaths among our ranks have fortunately been below the average in number. The first among our departed Fellows whom I have to mention, and whose death took place in the south of France, at Cannes, on March 4th of last year, is *Mr. Thomas Blizzard Curling*, who up to a few years before his decease occupied a prominent position in London, until advancing age and infirmity caused him to abandon practice, and to seek for rejuvenescence in change of scene and climate. For fifty-one years a zealous member of this Society, Mr. Curling, beginning with the Secretaryship in 1845, successively filled all the offices of Councillor,

Treasurer, Vice-President and President, which last post he occupied in 1871 and 1872, while in the intervals he worked on the Library Committee, and contributed as many as thirteen papers to the 'Transactions.' As a referee Mr. Curling was appointed no less than five times; the last time succeeding the period of his Presidency, which fact is strong proof of the estimation in which his judgment was to the very last held by his contemporaries.

Mr. Curling was born in Tavistock Place, London, on January 1st, 1811, his father being Secretary to the Commissioners of His Majesty's Customs, a post of considerable dignity and emolument. After receiving his education at Manor House, Chiswick, he entered the medical profession, and at the early age of twenty-one, through the influence of his uncle, Sir William Blizzard, was appointed Assistant Surgeon to the London Hospital, in which capacity he served for many years before he was made full Surgeon in 1849. His eminence as a Surgeon was soon recognised by the profession, and although his practice became by force of circumstances somewhat special, he always exhibited a thorough appreciation of all subjects bearing upon scientific medicine, as proved by his numerous writings, a list of which now lies before me. In 1859, Mr. Curling was appointed Examiner in Surgery to the University of London, having previously, in 1850, become a Fellow of the Royal Society. In 1864 he was elected on the Council of the Royal College of Surgeons, and in 1873 he filled the distinguished post of President of that body. Here, as elsewhere, he enjoyed the perfect confidence of his colleagues, on account of his zealous activity and conscientiousness, and the great interest he took in all his work. In the history of the Royal College of Surgeons it would be interesting to note that Mr. Curling was one of the first batch of three hundred Fellows elected under the altered constitution of the College in 1843.

Mr. Curling's first literary work is dated 1832, when he published fifty cases from his experience at the London Hospital in the now defunct 'Medical Gazette.' This

paper was followed by others—"On the Cranium," "On Paraplegic Affections of the Bladder," "On Trichina Spiralis," "On Hydrophobia"—and in 1836 Mr. Curling obtained the Jacksonian Prize for his essay on Tetanus. His work from that time to the end of his practical career was multifarious, but always conscientious and valuable, and no history of British Medicine would be complete without alluding to the influence Mr. Curling exerted beneficially in many directions. His largest literary efforts were, 'A Practical Treatise on the Diseases of the Testicle,' first published in 1843, and his 'Observations on the Diseases of the Rectum' in 1851; both went through numerous editions, and were translated into foreign languages. There are not, probably, many English works which have had the honour conferred upon them of being translated into Chinese, as was the case with the first of the two just mentioned. Dr. Manson, in 1866, accomplished this Herculean labour. Time would not allow me to enter here into a detailed criticism of Mr. Curling's work, but it cannot fail to be interesting to the Fellows of the Society to be reminded of the titles of the chief papers which that gentleman contributed—be it remembered under the high sanction of the Council—to their 'Transactions.' The elder Fellows will doubtless recall the wide impression that many of these made upon the profession at the time of publication. The twentieth volume of the 'Transactions' (1837) contains Mr. Curling's "Observations on some Forms of Atrophy of Bone." Soon after we find "A Case of Congenital Absence of the Pericardium;" then a paper "On a Rare Species of Hydatid, Echinococcus, in the Human Liver;" and in 1842 appeared the important observations "On Acute Ulcerations of the Duodenum in Cases of Burn." Passing over minor contributions we come, in 1850, to "Two Cases of Absence of the Thyroid Body, connected with Defective Cerebral Development," in which Mr. Curling, according to Mr. Jonathan Hutchinson, appeared to anticipate the more recent teaching regarding myxœdema. Mr. Curling's last contribution to the 'Medico-Chirurgical Transactions' was made in

1860, and bore the title, "Inquiry into the Treatment of Congenital Imperfections of the Rectum by Operation, founded on an Analysis of 100 Cases."

As a teacher Mr. Curling was highly esteemed at the London Hospital. Punctual and careful himself, he was strict in demanding care and precision in his students, many of whom survive to thank him for the doctrines and the practice he inculcated.

Mr. Curling was a man of commanding stature, and though not endowed with the faculty of being all things to all men, was a staunch and sincere friend, whom to know was to trust and to honour. Of his work I have endeavoured to give you a brief outline, and I am satisfied that the younger generation of medical men may study his professional contributions to science with a certainty of having their emulation and ardour stimulated, and their labours guided, by a safe and profitable example. Those who had the advantage of his friendship will continue to remember him with esteem and affection.[1]

The same month in which Mr. Curling departed this life is marked by the death of another Fellow, *Dr. Nicolas Parker*, who joined our Society in 1847. He was born on July 4th, 1821, and entered the London Hospital as a pupil, in 1839. He appears to have been a zealous worker, as when he was nominated for election into the Royal Medical and Chirurgical Society he is described as holding the appointment of Microscopical Demonstrator of Morbid Anatomy at the London Medical School. His paper of recommendation was signed by all the leading members of the staff of his School. From the same document we gather that at that time he was M.B. of the London University, which degree he took in 1844, the degree of M.D. following in 1847, on each of which occasions his name appeared in the first division. In 1859 Dr. Parker was elected to the Fellowship of the Royal College of Physicians. In 1851 Dr.

[1] The 'Athenæum' for April 14th, 1888, states that the late T. B. Curling, F.R.S., bequeathed £200 free of legacy duty to the Scientific Relief Fund of the Royal Society.

Parker was elected Assistant Physician and in 1863 Physician to the London Hospital, and from 1856 lectured there on Medicine, in conjunction with Dr. Little, for several years. A gentleman, now on the staff of the London Hospital, who attended his lectures, reports Dr. Parker to have been a most excellent lecturer and teacher, and a most amiable, courteous, and pleasant gentleman. His contributions to medical literature are to be found in the twenty-second and twenty-third volumes (1850 and 1851) of the 'Medical Gazette,' one entitled "Contributions to Psychological Medicine," the other, "Contributions to the Pathology of the Nervous System." He is stated to have resided in those days, and to have practised, in Finsbury Square. In 1866 Dr. Parker resigned his appointments at the Hospital on account of failing health; and, being possessed of means, resided for some years in France. The outburst of the Franco-German war caused him to leave that country, and in 1874 he took up his abode at Ramsgate, where he remained, paying occasional visits to London and the Continent, till his death. In 1883 he was stricken with right-sided paralysis. It affected his speech for a short time only, but he never recovered the use of his arm and leg. I am informed that his intellect was unimpaired to the last, when, after a six weeks' illness, he succumbed to pneumonia, at the age of sixty-six. Like that of his successor in this obituary record, Dr. Parker's name had not been widely known, though from what has been gathered concerning them both, they have by no means spent unprofitable lives.

Dr. Christopher Thomas Richardson, of Nelson Crescent, Ramsgate, died there on the 4th April of the past year, at the age of seventy-three. He became a Fellow of the Royal Medical and Chirurgical Society in 1852. It may interest those members of our Society who are fond of antiquarian minutiæ to be informed that his recommendation paper was one of the first to be presented in the printed form; previously the wording was the same,[1] but the whole was in

[1] The last written recommendation for that of the Fellowship was that of

manuscript. I have learned by this inquiry that all recommendation papers are scrupulously preserved in our archives, and they thus form a collection of autographs which many may like to examine.

Dr. Richardson took the degree of M.B. at Cambridge in 1844, became M.R.C.P. in 1859, and, according to the Medical Directory, was Physician to the Blenheim Street Infirmary and the Metropolitan Free Hospital. Besides being a Fellow of our Society he was also a Fellow of the Geological Society. I am unable to inform you when he withdrew to Ramsgate, but it is evident that, after leaving London, he continued to be fond of scientific pursuits, for he is reported as having been President of the Ramsgate Scientific Association.

The following particulars are communicated by a friend of Dr. Richardson's of many years' standing:—He is stated to have belonged to an old Westmoreland family, and in consequence of the early death of his father to have been adopted by his uncle, a north-country rector, who apprenticed him to a medical practitioner in the Borough, and entered him at St. Thomas's Hospital, which in those days occupied the site now filled by the London Bridge Station. Dr. Richardson never seems to have sought for practice as a general physician, but to have attended specially to lunacy; he was always a student and a man of very varied attainments. Ramsgate appears to have had special attractions for him, and his residence in the county of Kent caused him to write a book, of which I do not possess the title, relating to that part of the country. Dr. Richardson, as I am informed, was regarded by those who knew him as a pleasant companion, a man of cultured taste, and a Christian gentleman.

The month of May was fatal to a gentleman who for many years was reputed for his large general practice in the West-end, and was probably known to many among my audience: I refer to *Mr. Walter T. Bryant.* Mr. Bryant

Dr. Cutler, of Spa, 27th April, 1852. The first printed one was that of Mr. A. G. Field, November 9th, 1852.

died in the seventy-sixth year of his age at his residence, Highwood near Reading. His first teacher was his father, who practised in the Edgware Road, long before the neighbourhood had become as populous as it is now. At the age of twenty-seven he married the daughter of Major Parris, and entered into partnership with his father. Having passed the examination of the Apothecaries' Company in 1839, he became M.R.C.S. in 1840, and F.R.C.S. in 1858. In 1870 Mr. Bryant obtained the Licence of the Royal College of Physicians of Edinburgh. About this time he appears to have taken up his residence near Reading, and only to have visited London on three or four days in the week, but even this proved eventually too much for his strength, and he succumbed to senile gangrene and exhaustion.

Mr. Bryant was elected a Fellow of the Royal Medical and Chirurgical Society in 1855. His biographers[1] state that "his ingenuity in contriving means of relieving pain and in the general management of the sick room was of striking value to him; but probably the true key to his success as a practitioner was his devotion to the interests of his case. No trouble, no fatigue, no pains, were too great for him, if only he thought there was a chance of relieving the sufferer, and this devotion was amply reciprocated by those he attended." Mr. Bryant is stated to have been naturally of a cheerful disposition, ever welcome at the bedside, and in general society always making his mark by the large fund of general information and anecdote which he possessed.

Dr. Thomas Harrington Tuke is the next Fellow of this Society in my obituary list; he was called away on the 9th June. He was one whom all who knew him, and they were very numerous, will recall with genuine affection and respect, the more so as

"E'en his failings leaned to Virtue's side,"

for his latter days were clouded by pecuniary difficulties, which are attributable to an unselfish generosity. Dr.

[1] 'Brit. Med. Journal' and 'Lancet,' May 26th, 1888.

Harrington Tuke, who is not to be confounded with the English family of the same name and distinguished in the same paths of medical science, was of Irish descent, his ancestors having long lived in Tralee in the county of Kerry. His father, Dr. Edward Francis Tuke, migrated across the Channel, and the subject of this notice was born at Bristol in 1828 on the 13th June; he was therefore within four days of his sixtieth year at the time of his death. He was buried at Chiswick on his birthday.

Dr. Harrington Tuke, after a preliminary education at Kensington School, obtained his medical education at St. George's Hospital, and passed the College of Surgeons in 1847; he obtained the degree of M.D. at St. Andrew's in 1849, and in 1868 had the honour of the Fellowship of the Royal College of Physicians of London conferred upon him. In conjunction with his mother, who is stated to have been a lady of remarkable administrative powers, Dr. Harrington Tuke, after his father's death in 1846, took charge of a private lunatic asylum, the Manor House at Chiswick, an institution which throughout enjoyed an excellent reputation. Dr. Tuke had made special studies under the celebrated Dr. Conolly at Hanwell Asylum, the chief promoter of the non-restraint system in the treatment of lunacy, and his intimacy with that benefactor of the human race, and his subsequent alliance with his family, cannot have failed to recommend him both to the profession and to the general public.

Dr. Harrington Tuke was elected to the Fellowship of this Society in 1862; was Honorary Secretary of the Medico-Psychological Association from 1864 to 1872, and its President in 1873. His literary efforts, as might be expected from his entire devotion to mental disorders, were confined to the discussion of questions relating to them. His papers all bear the impress of a well-stored and highly educated medical man, and may well be re-read at the present day. They are almost entirely confined to the earlier volumes of the 'Journal of Mental Science,' the fourth and fifth volumes of which contain articles from his

pen on the "Use of Warm and Cold Baths in the Treatment of Insanity." They are followed in successive volumes by eight articles on General Paralysis, in which he most elaborately and clearly discusses this formidable disease, and these may be regarded as constituting his chief claim to literary distinction. Other papers on the legal view of Insanity (in which he particularly discusses the case of Constance Kent, which at the time was one of intense interest to the entire community), and on Monomania (where he shows that the proverbial differences of medical men are exceeded by those of the lawyers), deserve attention and record; his literary efforts appear to have terminated with the Presidential Address which he delivered in 1873. The various communications that are at my disposal all coincide in speaking well of Dr. Harrington Tuke, dwelling upon his geniality, good nature, and liberality, and that verdict I do not doubt that all surviving friends willingly endorse.

Few Fellows of our Society have presented a more commanding figure for many years to wanderers in the West-end of London than the bearer of the next name that it is my duty to bring before your notice, *Dr. George Thompson Gream*, who, after having retired for some time from the fatigue of a large practice, died at Brighton of apoplexy, at the age of seventy-six, on the 20th of last July. Dr. Gream, the son of a clergyman, received his medical education at St. George's Hospital, and commenced what proved to be a very successful career as an accoucheur, in 1836. He subsequently took the degree of M.D. at St. Andrew's, joined the College of Physicians as a member in 1859, and received the honour of the Fellowship in 1867. In 1846 he became a Fellow of the Royal Medical and Chirurgical Society, and served on the Council in 1863; in 1861 he joined the Obstetrical Society of London, of which he was a Vice-President from 1864 to 1866. His professional position was marked by his appointment as Physician-accoucheur to H.R.H. the Princess of Wales, while his social status was characterised by his being a

Deputy-Lieutenant of Middlesex, a Justice of the Peace for Hampshire, and by his being a Knight of the Order of the Crown of Prussia. Dr. Gream never made any claims to literary distinction, and I have no record or recollection of his appearing in print, except as a controversialist, on the subject of the use of anæsthetics in childbirth, his views being strenuously discountenanced by Sir James Simpson, of Edinburgh. Dr. Gream was essentially the fashionable accoucheur of the day, especially after the death of his friend Sir Charles Locock, and he had the distinguished honour of attending the Crown-Princess (now the Empress-Queen Frederick) of Germany in Berlin during some of her confinements. He was a man of great stature and decidedly handsome, and at the same time of engaging and polished manners, which did not prevent his maintaining his independence of judgment. Having no family Dr. Gream was able to show extensive hospitality to his friends, and there must be yet many among you who remember how much at home he looked as a charioteer in his curricle, handling the reins and whip with grace and dexterity, in the crowded streets or parks of the metropolis.

Having thus briefly adverted to the losses the Society has sustained during the past Summer Session, I may be permitted to glance at the fruits that have ripened during the same period. It is impossible to peruse the papers that have been admitted into the 'Transactions' for 1888 without feeling that they mark a distinct progress in the march of medical science; while the dignity, knowledge, and good taste with which the discussions have been always carried on appear to me to be, as they ought, characteristic of such a brotherhood as ours, established for the promotion of medical knowledge and of the best physical interests of the community. One of the most important events that I may be allowed to put on special record is the award by the Society of the Marshall Hall Prize to Dr. Walter Holbrook Gaskell, F.R.S., for his neurological work, done during the preceding five years.

This prize was founded in 1872 as a memorial of one of the greatest neurologists of the last generation, and it is given quinquennially after anxious deliberation of the Council of the Royal Medical and Chirurgical Society "for the best original work done during the previous five years and recorded in the English language in anatomical, physiological, or pathological research, relative to the nervous system." Such a prize as this appears to me to be free from all the objections that may be justly raised against rewards that are based upon competition; and it at once ensures the perpetuation of a great name, and is a high honour to the recipient. I cannot resist the temptation of quoting to you the words of Dr. Ferrier, who, in 1883, occupied the same position as Dr. Gaskell did last year, with reference to Dr. Marshall Hall's claims to the grateful recognition of all future generations of medical men. Flourens and Marshall Hall were contemporaries, friends, and collaborators in the same field of science, and while associating their names, Dr. Ferrier observes: "If at the distance of fifty odd years we compare the relative stability of the work done by these great men, that of Marshall Hall on the spinal cord, and that of Flourens on the cerebral hemispheres, we find that the doctrines enunciated by Marshall Hall, modified perhaps as to detail, and further extended by the numerous researches of recent years, are in all essential points those which still prevail, and show no signs of failing; while those of Flourens, which have also exercised an enormous influence on clinical medicine and pathology—what shall we say of them?"

Whether any of Dr. Gaskell's conclusions will stand the test of time and further research, I may safely leave to my successors to determine. In the meantime, we may thank him cordially for his observations on the anabolic and catabolic divisions of the nervous system, and his discovery of the difference of structure of the two kinds of nerves subservient to these functions, together with his researches into the relation of the sympathetic with the cerebral ner-

vous system. Whatever modifications may result from future investigations, the Royal Medical and Chirurgical Society will ever claim it as a distinction that it has had it in its power publicly to show its recognition of distinguished merit by awarding the Marshall Hall Prize to such labourers in the cause of science as Dr. Gaskell, Dr. Ferrier, and Dr. Hughlings Jackson.

We have no prize to give for eminence in Surgery. Were there one for the work of the year there might be a difficulty in deciding, where there has been so much that is excellent, who the holder should be. Far be it from me to "rush in where angels fear to tread," but I cannot refuse myself the pleasure, and I trust it may be with your approbation, of alluding to one work, a true medico-chirurgical offspring, which our last Summer Session brought forth, under the auspices of Dr. Gowers and Mr. Victor Horsley.

No better illustration could be given than this case of the value of scientific co-operation, of which the Winter Session has also afforded an excellent instance in the paper on Actinomycosis, by Dr. Douglas Powell, Messrs. Godlee, Taylor, and Crookshank. Dr. Gowers' and Mr. Horsley's case distinctly marks the progress which has been made during the present quarter of a century, both in precise diagnosis and in the perfection of our surgical resources. The last volume of our 'Transactions' enables every Fellow to judge of the value of the various contributions, and it would be a work of supererogation, if not an act of impertinence, on my part, to go into any further critical detail; but I could not with propriety occupy this chair and refer to the past Summer Session, without adverting to evidence afforded in the Royal Medical and Chirurgical Society of a marked advance in scientific medicine, an advance which but a short time back was stated, on high authority, to be "beyond the range of practical surgery."

The commencement of our Winter Session has brought sorrow to the hearts of all who were on terms of friendship

with *Dr. Edward Headlam Greenhow*, a physician of great ability and industry, who died suddenly, while on a visit to town from his country residence at Reigate, on the 22nd November, 1888. My first acquaintance with Dr. Greenhow dates more than thirty years back, when he first assisted me by contributing some valuable articles to the 'British and Foreign Medical and Chirurgical Review,' of which I at that time was Editor. I may be permitted to mention especially one on "The Local Causes of Cholera," and another on "Medical Sanitary Inquiries," in the volumes for 1857. To this Society's 'Transactions' Dr. Greenhow contributed three papers: the first, on "Brassfounders' Ague," in 1862; the second, "A Case of Congenital Imperfection of the Mammæ, Sexual Organs, and Sternum in a Woman, aged twenty-two," in 1864; and the third, on "Abdominal Aneurism successfully treated by Proximal Pressure of the Aorta," in 1873. But these papers by no means represented the most important of Dr. Greenhow's labours. He worked as a valuable coadjutor of Sir John Simon, whose Reports as Medical Officer of the Privy Council contain several papers by Dr. Greenhow, while separate works on diphtheria and on Addison's disease, with numerous contributions to the weekly literature of Medicine, have constituted him an authority on many points of permanent interest to our profession.

Dr. Greenhow was born at North Shields in 1814, where his father was in practice, and where he received his earliest education. After studying at Edinburgh and Montpellier, he joined his father in practice at Tynemouth, where he took special interest in sanitary questions, which his position as member of the Town Council and as Chairman of the Board of Health, gave him peculiar opportunities for prosecuting. Numerous sanitary improvements in North Shields and Tynemouth resulted from Dr. Greenhow's labours, while the experience he gained there proved of great value when he entered upon the larger sphere of work, which his removal to London, in 1852, opened for him. Before settling in the Metropolis, Dr. Greenhow

graduated at Aberdeen; he then passed the examination for the Membership of the Royal College of Physicians, of which body he was elected a Fellow in 1859. He delivered the Croonian Lectures at the College in 1875, taking for his subject Addison's disease; in 1879 he was appointed a Member of the Council, and in 1880 and 1881 he filled the office of Censor. His previous labours in the North thoroughly fitted him for a post, the first of its kind created in London, to which he was appointed in 1856, at the instigation of Sir John Simon, that of Lecturer on Public Health at St. Thomas's Hospital. Dr. Greenhow's sanitary work continued to be prosecuted under the auspices of Sir John Simon, and led to the passing of the Public Health Act of 1858. The numerous papers from his pen, published in the reports of the Medical Officer of the Privy Council of that time, are a standing evidence of his wisdom and research, and take high rank as scientific and literary productions. I have the permission of Sir John Simon to quote the following remarks, which he has kindly sent me in reply to an inquiry of mine relating to Dr. Greenhow's work:

"The manner, in my opinion, was as good as could have been, skilful, well considered, laborious, complete; and I may add, the value of it to the public service, for purposes of an administrative kind, seemed to me (as I at the time officially represented) of the highest importance." I can only make a passing allusion to Dr. Greenhow's contributions of the most valuable character to our knowledge of diphtheria, a disease which was scarcely known in England before 1855; to the causes of diarrhœa in some parts of the country; to the prevalence of lung diseases in certain industries, and to the causes of the excessive mortality of young children in our manufacturing population, to indicate the direction of his labours in connexion with the Medical Officer of the Privy Council. These papers are all worth careful study by medical men generally, and more especially by those who aspire to exercise a beneficial influence on the community as Public Health Officers.

Dr. Greenhow's appointment as Lecturer on Public Health, Joint Lecturer on Forensic Medicine in 1861, and, shortly after, as Assistant Physician to Middlesex Hospital, gave a new direction to his labours, while it showed that his work was receiving general recognition. This was still further marked by his election to the Fellowship of the Royal Society in 1870. In 1881 and 1882 the Clinical Society, which he assisted much in establishing, honoured itself by electing him their President; and, after filling this post, Dr. Greenhow quitted London, and retired to Reigate, but not to idleness, for he still retained two appointments which required his occasional presence in London. It was in connexion with one of these visits, when he was known to be in feeble health, that the fatal stroke overtook him. I cannot better sum up these brief remarks on a well-spent and most useful professional life, than in recalling the words with which a distinguished colleague of his concludes an account of his work:

"To the last Dr. Greenhow retained a warm affection for his former surroundings, and nothing delighted him more in the evening of his days than to tell his battles over again, or learn what was going on at institutions with which he was connected. If any man can be said to have entered fully into the spirit and labours of professional life, or to have worked with all his power in his sphere, it can be truly said of him. It is only when we look back through the long years of his fruitful and busy life, when we remember the qualities of perseverance and energy, the love of method and discipline, and the attachment he had to Medicine, that we can estimate how full his life was and how much he accomplished. He at least must be admitted to have earned his rest." [1]

Dr. Greenhow was twice married. His first wife, the widow of William Barnard, Esq., died in 1857, leaving one son, now Vicar of Earsdon. His second wife was the daughter of the celebrated political economist and Member of Parliament, Joseph Hume. She died in 1878, and

[1] Dr. Coupland, 'Lancet,' December 1st, 1888.

two daughters survive to mourn the loss of both parents. Shakespeare's words, so often used to express our feelings with reference to departed friends, convey a special truth when applied to our late Fellow, Dr. Greenhow:

> "His life was gentle; and the elements
> So mixed in him that Nature might stand up
> And say to all the world: *This was a man!*"

On the 5th Dec., 1888, *Mr. Benjamin Mallam,* of Rose Bank, Exeter, whose Fellowship of our Society dates from 1876, departed this life at the age of sixty-three. Owing to ill-health he had retired from a large general practice for ten years prior to his decease, and I am indebted to Dr. Lewis Shapter, who attended him during his long illness (progressive muscular atrophy), for the chief points in the brief memoir of Mr. Mallam's career. It appears that he was the son of a medical man, and was professionally educated at St. George's Hospital, to which, as to his early teachers, he was much attached. It was only necessary to mention the name of Keate to rouse all Mallam's enthusiasm for his old instructor, of whom he would say that he was a grand Surgeon, but that he had an unfortunate trick of "taking a comb out of his pocket, to stimulate thought on any case requiring more than usual tact and judgment. This proceeding was one day evidenced in the presence of the King, and the story goes that the act materially influenced the Royal favour." I am assured that the anecdote is authentic. After obtaining the Membership of the College of Surgeons in 1848, and the License of the Apothecaries' Company in 1850, Mallam did good work in the neighbourhood of London; subsequently, he bought a practice in Frome, in Somersetshire, and in 1862 moved to the neighbourhood of Camden Road, London, where he enjoyed an extensive practice till his health failed him. He appears to have been of an inventive turn of mind, for a trocar for ovarian dropsy, a splint for fractured patella, and an instantaneous vaccinator, are among the appliances attributed to him, and, as I am informed, still

known by his name. He published 'Hints to Mothers and Nurses,' 'The Approach of Cholera,' and 'The Therapeutics of Phthisis.' My informant concludes his notes on Mr. Mallam with the remarks: "Always loyal to his profession, grateful to his teachers, willing to assist others and to impart practical guidance, Benjamin Mallam made true friends, and has left his work, enthusiasm, and kindness of heart for remembrance." What better epitaph can be desired?

The three Fellows whose names I have next to add to the melancholy death catalogue of the year, Dr. George Duff, Dr. Benjamin Ridge, and Mr. William Oliver Chalk, were all elected to the Fellowship of the Society in 1845.

Dr. Duff died at Elgin, where he had practised since 1856, on the 11th January, 1889. I gather from a long biographical notice of him given in the 'Elgin Courier' that he was a very prominent and highly esteemed descendant from an ancient and influential family in Morayshire, and that as late as last New Year's Day he was in good health. Shortly afterwards he was attacked by erysipelas, followed by pneumonia, to which he succumbed. Dr. Duff graduated M.A. at Aberdeen in 1838, and in 1841 took the degree of M.D. at Edinburgh. He commenced practice in Genoa, then for a few years was domiciled in London, and finally settled at Elgin. Here for many years he was Physician to Gray's Hospital and to Anderson's Institution, and the appreciation which he enjoyed among his medical brethren is shown by the fact that he was elected President of the Northern Branch of the British Medical Association. His fellow-citizens proved the esteem in which he was held by them, by electing him to various civic offices, and his many excellent qualities of head and heart were largely dwelt upon after his death in the pulpits of Elgin. His age at death was seventy.

Mr. William Oliver Chalk, of Nottingham Terrace, Regent's Park, and of Vine Cottage, Norwood Green, died at a very advanced age on the 21st November, 1888. He was born in the Cathedral precincts, Canterbury, in 1803,

obtained the Licence of the Apothecaries' Company in 1826, and the Membership of the College of Surgeons in 1827, after going through his curriculum at Middlesex Hospital during the time that Sir Charles Bell was attached to it. Before settling as a practitioner in London Mr. Chalk passed a year at Paris, studiously attending the cliniques in that town. I am informed that Mr. Chalk was particularly struck with the mortality of phthisical patients in the Parisian hospitals, and that his interest was specially aroused with regard to the treatment of this and allied affections, which led him early to recognise the value of cod-liver oil in their treatment. After his return from Paris Mr. Chalk was appointed House Surgeon to the Margate Infirmary for Scrofula, where he used his opportunities especially for the study of morbus coxæ. His experience in this disease is embodied in a series of interesting articles contained in the twenty-seventh volume of the 'London Medical Gazette;' but cod-liver oil does not receive any mention in these papers. He appears early to have appreciated its value in treatment, for soon after the publication of Dr. Hughes Bennett's memoir on the subject, Mr. Chalk wrote two interesting papers embodying his experience in the 'Medical Gazette' of 1843.[1] These papers are dated from 3, Nottingham Terrace, which remained his town residence to the termination of his life. Although engaged in a large general practice, and during the last twenty years of his life the proprietor of a private lunatic asylum at Norwood. Mr. Chalk found time to contribute various papers to medical literature. Thus in 1852 we find in the 'Medical Times and Gazette' an interesting illustrated communication on "The Blood-vessels and Trabeculæ of the Spleen," in which the author particularly combats Kölliker's teaching with regard to the structure and purpose of the trabeculæ. The 'Transactions' of the Pathological Society contain in vols. ii, viii, ix and x papers on "Cancerous Ulceration of the Foot," on "Partial Dislocation of the Lower Jaw from an Enlarged Tongue," on "Morbus

[1] See pages 414 and 441.

Coxæ," and on "Colloid Cancer of the Sigmoid Flexure of the Colon complicated with Incarcerated Hernia," all of which may be perused at the present day with interest. In 1872 and 1873 Mr. Chalk was a Member of Council of this Society.

Though a student throughout his life, Mr. Chalk, as I am informed by his friend Dr. Sidney Coupland, was not readily impressed by some of the doctrines of modern schools. He appears specially to have distrusted the theories connected with the cell doctrine, in its application to physiology and pathology, as he declined to accept modern observation upon the structure and nature of tubercle. But for all that, as I am told, "his practice was neither stereotyped nor antiquated. It was at any rate successful, and that he was open to new ideas in this respect may be seen in the fact, that within the last year of his life he was engaged in preparing a paper on whooping-cough (from which he himself suffered when eighty-three years old) and its treatment; his view (which he demonstrated in many cases) being that the ulceration of the orifice of Wharton's duct had much to do with the disease, and that the most appropriate treatment was the frequent use of the sulphurous acid spray."

Mr. Chalk was twice married. His first wife was the youngest daughter of Mr. Hill, of Park Place, Regent's Park; his second, who survives him, was the second daughter of Dr. Stevenson Bushnan, formerly editor of the 'Medical Gazette,' and for many years connected with Laverstock House, Salisbury. It was not till within a year of his death that Mr. Chalk showed signs of failing health, and after some suffering, an attack of hemiplegia, followed by coma, ended a long and meritorious life. It is pleasant, in concluding this notice, to reproduce the words with which his friend Dr. Sidney Coupland terminates the obituary notice he communicated to the 'Lancet' at the time of his death:—"In him the profession has lost an upright, honest, and faithful member; one who, always genial and kindly, was singularly unassuming and devoid

of self-seeking. He was content to pursue the even tenour of his way in doing good to others, oftentimes without any reward but the gratitude of those whom he benefited. In this, his life will serve as a bright example to those who come after him."

The last Fellow but one of whom an obituary notice is due to you is *Dr. Benjamin Ridge*, whose death took place on January 9th, 1889.

All inquiries that have been initiated regarding Dr. Ridge's antecedents have been fruitless, and I am reduced to confine the brief statement I have to make regarding him to a quotation from the 'Medical Directory.' It appears that Dr. Ridge was educated at Guy's, that he became a L.S.A. and M.R.C.S. in 1836, and F.R.C.S. in 1854. He enjoys the title of M.D. in our list of Fellows, but it is not given in the 'Directory,' and we do not therefore know where he took his degree. He was the author of a work on "Glossology," and several other contributions to medical literature. Dr. Ridge never filled any office in our Society.

Only this evening the death of *Dr. Samuel Hill* has been announced to me, and I can therefore only give the following brief record of his career. He was born near Lurgan, in Ireland, in the year 1830. He began his professional studies at the Richmond Hospital, Dublin, in 1847, and obtained a license in Midwifery at the Rotunda Hospital in 1849, and became resident officer to the Whitworth Medical and Hardwick Fever Hospital. He became a Licentiate of the King's College of Surgeons, Ireland, in 1851, Licentiate of the Royal College of Physicians of Edinburgh in 1860, and Doctor of Medicine at St. Andrew's in 1862.

During several epidemics of cholera and typhus fever in Belfast Dr. Hill was employed by the Government, and the skill and zeal he displayed in these trying times did much to alleviate the distress. He came over to England in 1852, and after spending two years in Gravesend, settled in Mecklenburgh Square, where he continued in active

practice until the day of his death, which took place suddenly at 2 a.m. on Sunday last, 24th February, 1889. He was elected a Fellow of this Society in 1867.

The sketch of the immediate past of our Society, which I have offered to you, seems to me, like all retrospects, to justify a brief consideration of our future. I trust that you will not accuse me of a *cacoëthes loquendi*, due to the proverbial garrulity of old age, if I touch upon some points that my long acquaintance with the Society, my recent experience of its working, and a general view of the advances of our profession during the last quarter of a century, appear to suggest. Should I say anything that you disapprove of I hope that you will see in my remarks nothing else than a proof of my ardent desire for the welfare and progress of our much-cherished Society.

We are all, and I think justly so, very proud of our Library. It probably may claim to be one of the most perfect and most useful collections of medical works either within or beyond the Empire. Its continual increase has already created physical difficulties in its housing, and the lapse of time is not likely to diminish them. An accident, however, during the past summer revealed to me that there is a decided lacuna in our Library. With another friend I determined to explore Epsom Wells, to ascertain whether any traces still existed of the once-famed waters and of the assembly and gambling rooms which in the seventeenth and eighteenth centuries attracted the sober citizen no less than the gay and giddy world of fashion. A book-loving son of mine found in a second-hand bookstall a very well-written work on Epsom which I studied before I undertook the trip.[1] But in our Library I could find little to help me, excepting the treatises by Grew and Saunders, the former of whom, at the end of the seventeenth century, wrote enthusiastically about sulphate of magnesia as the "Sal Nobilissimus;" the latter, at the beginning of the

[1] A book published anonymously in 1825, but written, as the authorities of the British Museum inform me, by Mr. H. Pownall.

present century, only refers to Epsom as a place that has lost its repute. A recent number of the 'Graphic,' no less than a well-known novel of Messrs. Besant and Rice, show what an important history the place had for about a hundred years. On further inquiry I have ascertained that as regards the mineral waters, the climatology and the local sanitary conditions of our country, our otherwise excellent Library is far from complete. I would ask whether this is right? Supposing an intelligent foreigner to visit us with the desire for information upon any one of the 250 places in Great Britain and Ireland mentioned in Osann's great work,[1] and to be told that we, professing to have one of the completest libraries of medical science, cannot fulfil his wishes, what would he think of us?[2] But still more, is it proper that we, who scour the world to find means of cure and recovery, should be unacquainted with the many adjuvants of health that a bountiful Providence has provided for us at home? When I was a young practitioner some knowledge of foreign watering places enabled me to bear with equanimity the covert or direct objection to people being sent abroad to benefit by waters that we do not possess, and I still hold that we have nothing to equal in character and efficacy some of the springs on the other side of the Channel and German Ocean that are known to you all; but I maintain that every year many patients are subjected to the fatigue, the bad food, and the stinks to be met with so often abroad, who would be infinitely better off with the home comforts, the cleanliness, and the careful medical supervision to be found in a well-selected British locality. We cannot here look for Government patronage and control of our health resorts—the more is it the duty

[1] "Physikalisch-medicinische Darstellung der bekannten Heilquellen der vorzüglichsten Länder Europa's," von Dr. E. Osann, Professor der Medicin, &c., Zweite Auflage, Berlin, 1839.

[2] I may mention parenthetically, that with Mr. MacAlister's assistance I have compared the list of authorities, whom Professor Osann quotes in his remarks on British Mineral Waters, with the contents of our Library, and I find no less than forty-two works by British authors mentioned, which the Library of the Royal Medical and Chirurgical Society does not possess.

of the medical profession to guide the public and to show them both what they lose and what they gain by foreign travel. How often do we find that our patients, trusting to mere latitude, spend wretched winters in so-called warm climates, how they return with seeds of disease, or starved from want of suitable nourishment.[1] Both the medical antiquary and the modern practitioner would look primarily to the Royal Medical and Chirurgical Society's library for information upon all British balneological and climatological topics of recent or ancient date. The defect that I urge is one that can scarcely be remedied by a mere money outlay. I would ask all friends, and especially the Fellows of the Society, to search their libraries for forgotten pamphlets, papers and books connected with the subjects adverted to. Much that is neglected and thrown into the waste-paper basket becomes of value as the time goes by, historically if not always scientifically.

There is, however, even a more important point than this lacuna in the library to which I have ventured to draw your attention, and for which I crave your aid. In my previous remarks I have adverted to the increasing difficulty of finding room for our books. But the time has arrived when this difficulty becomes annually more and more sensible in regard to other objects of our Society; and with the growth of the Society, its increasing work, and the reasonable requirements of many Fellows, it appears a paramount duty that we should seek a more roomy and more generally accessible home. For a Society like ours to stand still, must, in the nature of things, sooner or later

[1] Since this was written a very interesting pamphlet ('South Africa as a Health Resort,' 1888) by a former secretary of this Society, Dr. Symes Thompson, has come into my hands, in which the author makes the following remarks, which show that I am not singular in my advocacy of British unrecognised advantages:—"The public mind is slowly awakening to the knowledge that the British empire has climates adapted for every form of constitutional defect. Those in this room may do much to emphasise and to impress the fact that health and life may be secured and maintained at a higher level, and for a longer time, if we select with care and forethought the home for which we are fitted."

involve our being superseded by others that are more energetic, more powerful, more willing to recognise and be guided by the demands of the times—*audentes fortuna juvat.* Let us put our shoulder to the wheel, discard the word "impossible" from our vocabulary, and let your Council feel that "vis a tergo" which even so distinguished a statesman as Lord Palmerston considered a necessity, before embarking on great measures. Without your strongly expressed opinion and energetic support the Council are indeed powerless. There are, doubtless, pecuniary and other difficulties in the way, but I cannot regard them as insuperable; the higher our aim and the better the work done by our Society, the more certainly shall we meet with that recognition on the part of the profession which leads to success.

Since these words were written the question has, somewhat unexpectedly, assumed a more tangible and practical form, in which, on Monday next, it will be placed before you. It is not now my province to say more than to express a hope that, whatever decision you may arrive at, at the Special General Meeting of the Society, it may redound to the advancement of the high objects that our founders had in view.

I think that the medical profession will admit that the individual Fellows distinguish themselves by the admirable work that is manifested at our meetings and by our 'Transactions.' The care that is taken, under the bye-laws of the Society, regarding the admission of papers to our annual volume, is a guarantee that nothing unworthy of the scientific character of the Society finds a place in them, while I would challenge any experienced visitor to our meetings to name a similar assembly where the discussions are carried on with greater knowledge, more fraternal consideration, and more dignity. But I would ask whether these individual efforts are all that may be expected of a Society like ours, and whether it may not justly be demanded of us that we should exhibit collective power, and seek by combined labour to achieve the solution of ques-

tions that are scarcely within the scope of the individual and solitary inquirer. No new legislation is necessary that this may be done. No "great mutations" such as Falkland, ardent as he was in favour of reform of Church and State, declaimed against, are required here. Nothing more is necessary than that, in the spirit of our founders and predecessors, and under the sanction of our existing bye-laws, we should assist in the development of the resources at our disposal, and admit that the "Greater Britain," which had no existence when we received our charter, claims our sympathy and consideration in all matters relating to the cultivation and promotion of Medicine and Surgery, and to the branches of science connected therewith. When I had the honour of holding the post of Secretary, the Council instituted Scientific Committees, which have since then been more definitely recognised and have a chapter devoted to them in our bye-laws. Excellent reports on "Suspended Animation," on "Anæsthetics," and on "Diphtheria," show the utility and permanence of the work done, now a good many years ago, by such co-operation. These efforts cannot have exhausted our powers or the proper subjects for inquiry, for on the one hand there is a constant influx of new blood, and on the other, the questions pressing for such solution as our Society can give, are constantly multiplying and requiring to be dealt with. Our great colleges have very different functions to perform, and it appears unfair to blame them, as is sometimes done, for not departing from the track laid down for them by charters and Acts of Parliament. Our charter was granted for "the cultivation and promotion of Physic and Surgery and of the branches of science connected with them," under which heading are fitly embraced a variety of topics that directly bear upon the physical and social well-being of the community—such a variety and multiplicity of subjects, in fact, that it behoves us to be careful not to interpret the terms so liberally as to draw us away from the correct definition of our functions. Several topics of direct practical interest that have been brought out at recent meet-

ings might fitly have suggested the formation of committees to settle our present standard of knowledge on moot points. Medicine, Surgery, and Midwifery have not always found the speakers on the same side of a question that arose, and the attentive listener could not fail to desire that the differences could, at the date, be authoritatively compounded by a well-organised committee of inquiry. But if I may venture to say so, there are numerous medical, surgical, medico-legal questions, and others not immediately arising out of our regular work, which it is the duty of a Society like ours to take up and give a clear reply to, so far as the present state of science permits. The more impartial such reply is, the more it will weigh with the profession, and, in certain cases, with the general public. Far be it for me to suggest that the results thus obtained would be final; but they would, or ought to, mark the state of our knowledge at the time of inquiry, and in some cases the same matters might, after ten or twenty years, be taken up again by a similar committee, who, stepping "from precedent to precedent," would show the development, change, or deterioration, which time and circumstances might have effected.

Whatever inquiry we initiated, its proceedings would necessarily be carried on upon a strictly scientific basis, which involves impartiality as regards results. But as our researches involve also the advancement and benefit of our country, so we could not fail to arrive at conclusions that would redound to the advantage of our fellow-citizens. Thus, to take the climatology and balneology of Great Britain and its dependencies, a powerful committee reporting from time to time to the Council might establish, on the best evidence, the value of different localities in the treatment of disease, with an authority that no single writer could hope to exercise. Micrococci, bacilli, and bacteria, at the present time, although they have been before the world for a series of years, occupy in the minds of professional men a variable position in their relation to disease. We might not yet be able to solve all difficulties that present themselves in connexion with them, but a well-

organised committee might surely guide us in forming our opinion. Again, is the question of syphilis, in its multiform manifestations, in its relation to Medicine and Surgery, one to which we are able to give a categorical answer? A committee such as that contemplated might at all events fix what are the positive data at the present time, and what evidence is required to elucidate points that even now cannot be absolutely settled. Since the former report on suspended animation was published various physiological and anatomical investigations appear to invalidate some of the conclusions then arrived at. It seems to me that, for the credit of the scientific character of the Society, we are bound to renew our inquiry, and to state publicly to what extent our opinions on this point must be modified, or whether we endorse the conclusions adopted by our predecessors. These are subjects which I merely advert to in order to explain my meaning. Doubtless, if you endorse the general fitness of my proposition, other questions of similar or greater importance may suggest themselves to you, and rouse the dormant powers of this great Society.

When I look round in our meetings at the men occupying these benches, when I contemplate the countenances of the *patres conscripti* of your Council, and try to realise to myself the scientific energies that they represent, I trust I shall not be accused of exaggerating the capabilities of this Society if I sum up the observations I have submitted, humbly, for your consideration in the words: *Potest quia posse videtur.*

One word in conclusion. The President's duties are but slight in comparison with the onerous burden that falls upon the other officers of the Royal Medical and Chirurgical Society. To them, and especially to the Secretaries of the Society, Dr. Cheadle and Mr. Warrington Haward, I beg to tender my grateful thanks for the manner in which they have enabled me to fulfil my small share in the business of the Society, and for the cordiality and courtesy which

I have, through my year of office, met at their and all your hands.

I cannot make a parting bow to you without adverting in terms of the highest praise to the admirable manner in which our Resident Librarian, Mr. MacAlister, has fulfilled all the duties of his office, and without thanking him for the ready assistance he has given me in all matters in which I sought his aid.

REMARKS ON SOME POINTS

AFFECTING THE

MORTALITY OF ABDOMINAL SECTION.

WITH TABLES OF CASES.

BY

W. A. MEREDITH, M.B., C.M.,

SURGEON TO THE SAMARITAN FREE HOSPITAL.

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THE purpose of this paper—as stated in its title—is to draw attention to certain points affecting the present rate of mortality after abdominal section, as compared with that which prevailed so recently as ten years ago.

The progress made in all branches of abdominal surgery since 1877 would afford altogether too wide a field for discussion; and I therefore propose to limit my remarks to operations for ovarian growths, as being to some extent representative of the entire question under consideration.

As a basis for the inquiry, I have taken the results of my own work in connection with diseases of the ovary up to the end of 1887. The cases, here recorded in a tabulated form as affording the readiest means for identification and reference, consist of 104 completed ovariotomies, and of

twelve cases of removal of diseased uterine appendages. To these two I have added a third group containing four incomplete operations and six exploratory incisions, in order to complete my list of ovarian operations to the above-mentioned date.

The details appended in the Tables sufficiently indicate, in most instances, the nature and consequences of the individual operations, thus rendering further allusion to the majority of them unnecessary. Certain facts connected with the first two groups require, however, to be noted; and special reference will be made to the fatal cases contained in the ovariotomy series.

All my operations have been performed with strict antiseptic precautions, including the use of the carbolized spray: and I will first allude to this method of treatment, because I believe that the increased success of peritoneal surgery at the present day is in great measure—directly or indirectly—attributable to the outcome of the teaching of Lister.

Having early acquired a strong faith in the value of carbolic acid during my residence in Edinburgh, I was still further influenced in favour of antiseptics when I began working at abdominal surgery in 1881, by the success then attending their use in the hands of my colleague Mr. Thornton at the Samaritan Hospital; and the fact that I lost only two patients out of my first thirty ovariotomies, proved a very decided encouragement to pursue the system rigidly. I have accordingly continued to use it, and so far, see no reason to regret having done so. For some time past I have been less inclined than formerly to look upon the spray as an absolute essential to the safeguards of antiseptic abdominal surgery; but I still consider it valuable as the most convenient and effectual means of antiseptic irrigation at our disposal when dealing with the peritoneal cavity; and for this reason I still employ it.

The fact that certain operators who formerly used antiseptics now obtain improved results with the help of plain water and the systematic employment of the drainage-tube, by no means convinces me that their present success is

entirely due to the alteration in their system of treatment. Such an argument would quite ignore the influence of increased skill and experience—two factors which must of necessity largely affect the attainment of success in abdominal work, as in any other department of surgery.

The consecutive series of 104 completed ovariotomies recorded in Table I, includes ninety-six cases of ovarian tumour, and eight cases of parovarian or broad-ligament cysts.

Of these patients, seventy-three were operated on in hospital; while the remainder, thirty-one in number, were treated in nursing homes or in private houses. Reference to the Table will show that the relative mortality of the two groups was as nearly as possible equal.

Both ovaries were taken away in seventeen cases, two of which terminated fatally (Nos. 60 and 90); but in neither instance was the result in any way attributable to the removal of the second ovary.

Adhesions, resulting from more or less extensive inflammatory action, were met with in fifty-six cases, in forty-five of which they were of a nature to increase the risks of the operation. Among this latter number are included seven fatal cases.

Partial enucleation of the tumour was required in seventeen cases, and four of these patients died. In five other cases *complete* enucleation was performed, the resulting rent in the broad ligament being in each instance subsequently closed by means of a continuous suture of fine silk after all hæmorrhage had been arrested. These latter patients all did well, and I believe that the plan here adopted of accurately repairing any extensive injury inflicted on the pelvic peritoneum during the removal of a broad-ligament growth, is one which may be followed with advantage.

Eight of the patients had been *tapped* previously to operation, and of these two died. I do not here propose to discuss the question of this treatment, but will merely state my most cordial agreement with the opinion expressed

before this Society by Mr. Thornton in 1886,[1] when—speaking of the dangers incurred through tapping ovarian and parovarian or broad-ligament cysts, he alluded to the practice as both "*unscientific* and *pernicious*." The truth of this criticism will, I believe, be pretty generally admitted at the present day; but I may nevertheless briefly refer to one of the above-mentioned cases (No. 58) as serving to illustrate the appropriateness of the term "*unscientific*" applied to the procedure in question.

The patient, a lady sixty-eight years of age, first consulted me in October, 1884, on account of the presence of a large flaccid abdominal cyst. She stated that she had been *once* tapped, twenty-five years before, *i. e.* in 1859, by the late Sir William Fergusson, who considered the fluid then drawn off as characteristic of an ovarian tumour. The cyst, however, did not refill as expected; and from that date she remained in good health until within two years of my seeing her, when the abdomen again began to enlarge. At the operation I removed a unilocular non-adherent ovarian cyst, containing twenty-two pints of fluid laden with cholesterine. The left ovary was atrophic. Subsequent examination of the cyst tended fully to confirm the opinion as to its probable identity with the original cyst which had been tapped twenty-five years before, and had presumably since then lain quiescent until within two years of its successful removal.

This case, which, in my experience, is unique as regards its history, forcibly illustrates the fallacy of the theory that simple withdrawal of the fluid from a closed secreting cyst can be followed by final obliteration of its cavity, at all events in the case of *ovarian* growths. That the same holds true in regard to *parovarian* or *broad-ligament* cysts, is more than probable from what we know of their structure and secreting properties; and this view is further supported by the well-ascertained fact that tapping in such cases is as a rule followed by more or less speedy reaccumulation of the cyst fluid.

[1] 'Med. Chir. Trans.,' vol. lxx, p. 49.

Drainage of the peritoneal cavity was carried out in eighteen instances; and of these no less than fifteen are included among the latter half of my cases—a fact to be chiefly accounted for, I believe, on the grounds of increased experience in the management of the tube, and consequent increased belief in its usefulness in certain conditions.[1]

A point to which I would draw attention in connection with this subject is the age of these eighteen patients who were drained. If one excludes three cases where the tube was used on account of special operative complications, viz. incomplete removal of an adherent Fallopian tube (No. 86), injury to bladder (No. 89), and escape of fluid from a dermoid cyst, necessitating washing out of the peritoneal cavity (No. 94), it may be seen on reference to the Table that the average age of the fifteen remaining patients exceeded fifty years, ranging from forty-one to sixty-three.

Allusion to this fact is made in support of the opinion that the cases requiring drainage are, as a rule, those of women who are passing through, or have recently passed, the menopause.

In patients *under* forty the tube is very rarely needed after antiseptic ovariotomy, unless in exceptional circumstances. But in *older* women its employment is more often advisable. Such patients are not unfrequently the subjects of some amount of latent renal mischief, which may declare itself only too plainly when the extra work entailed upon the kidneys by the attempt to carry off peritoneal fluids, comes to be encountered. Under such conditions, I believe that the tube may prove of the greatest value.

With my present views on this question, I consider drainage advisable:

1. In cases of ruptured or inflamed cysts, especially when tapping has preceded the major operation.

2. In any case where fluid of an irritating or possibly

[1] Of 3 drainage cases among my first 52 patients 1 recovered and 2 died; while out of 15 such cases included in my second series of 52, 13 recovered and but 3 died.

septic nature has escaped into the peritoneal cavity during the removal of a cyst or of a dilated tube.

3. In all operations complicated by serious injury to bowel or urinary bladder.

4. In every instance where washing-out of the peritoneal cavity has been resorted to, whether on account of pre-existing sepsis, or for the purpose of removing extravasated fluid or blood-clot.

5. Finally, in all cases of severe operation in middle-aged or elderly women, my rule would be, *when in doubt, to drain*. The tube, if properly managed, can do no harm, and I am convinced that not only is it often most useful in promoting a speedy and uneventful convalescence, but that it not unfrequently saves life.

A kindred subject to that of drainage is the *washing-out of the peritoneal cavity*. My own experience of this treatment has so far been limited to but three cases—one of ovariotomy and two of hæmatosalpinx (see Tables I and II); but I have watched its results in a large number of instances, and am much impressed by its efficacy in cases where no antiseptic precautions have been used during operation.

From the standpoint, however, of one who still believes in the value of such precautions, as compared with simple cleanliness, I cannot but feel that the system, in its general application to abdominal surgery, is not as yet perfected, since we lack an antiseptic which can with safety be used for thus freely cleansing the peritoneal cavity, in sufficiently strong solution to ensure destruction of pre-existing sepsis. Meantime, I believe that plain, recently-boiled water, to be cooled as required by the addition of a saturated solution of boracic acid, is the best thing to employ for this purpose in putrid cases.

The use of a blunt-pointed siphon tube, whereby the inflowing stream is conveyed direct to the pelvis, will tend to avoid the spreading upwards among the intestines of septic particles, which might thence escape removal by the outgoing stream of water.

Of the 104 patients included in this series (Table I), ninety-four recovered and ten died. Such a mortality—9·6 *per cent.*—compares not unfavorably with that of 13·2 *per cent.* shown in the combined records of 512 ovariotomies published in the 'Transactions'[1] of this Society so recently as in 1881; but it is still in excess by at least a third of what one may reasonably hope, with increasing experience, to attain to in the future.

At the same time I am not much inclined to believe that, even in the hands of the most skilful, any really large series of operations for the removal of *ovarian tumours* will show an average death-rate of less than 5 or 6 per cent., although the long lists of fortunate recoveries occasionally met with in medical literature might appear to warrant a different assumption. My view of the subject is, however, supported by the fact that so experienced an operator as Mr. Thornton, in his latest published series of 300 operations, has not reduced his average mortality below 7 per cent.[2]

In attempting to analyse the causes of failure in my ten fatal operations, I have grouped them as follows, the numbers appended corresponding in each instance with those in the Table.

Septicæmia (two deaths).—No. 14 was a case of putrid cyst with a twisted pedicle and universal adhesions. The patient, who had been recently confined, was extremely ill, and suffering from the effects of septic absorption at the time of operation. She died of blood-poisoning on the fourth day.

No. 31, a most unfortunate case, terminated fatally after a perfectly simple ovariotomy, from well-marked septicæmia due to infection conveyed through the sponges used at the operation.

Intestinal obstruction (one death).—No. 53, a feeble old woman, died on the fifteenth day after operation, worn out by persistent vomiting during the last week of her life. This was found post mortem to have resulted from a twist

[1] 'Med. Chir. Trans.,' vol. lxiv, pp. 103—183.
[2] Ibid., vol. lxx, p. 44.

of the ileum above the seat of an adhesion between the gut and the back of the uterus. A timely reopening of the abdomen would in all probability have saved the patient's life, and my only consolation is that the lesson here taught me proved useful in a later case (No. 67),[1] where prompt operative interference under similar conditions was followed by complete recovery.

Hæmorrhage (one death).—No. 90, a simple ovariotomy, complicated only by the removal of the second ovary. Symptoms of internal hæmorrhage followed within a couple of hours of the patient's return to bed, but I was unfortunately not sent for until too late. On reopening the abdomen the outer loop ligature on the tumour pedicle was found to have slipped, permitting retraction of the ovarian artery. This was secured by a fresh transfixion and ligature of the broad ligament; the clots were then cleared out, and the abdomen was closed after insertion of a drainage-tube. The patient, who had lost an enormous quantity of blood, never rallied, and died in the course of the night.

Dysenteric diarrhœa (one death).—No. 60, a delicate woman with a tuberculous history, died on the ninth day after operation from exhaustion due to uncontrollable diarrhœa. Post-mortem examination revealed extensive dysenteric ulceration of the colon. Both kidneys were much diseased.

Chest complications (two deaths).—Both these followed on the removal of large tumours from aged and very feeble women, the subjects of chronic bronchitis.

No. 15 died on the fifth day with symptoms of general pulmonary œdema, the abdominal condition remaining satisfactory to the last.

No. 77, after doing well for forty-eight hours, was being raised in bed on the morning of the third day, when she suddenly collapsed and died, presumably from embolism.

Exhaustion (three deaths).—No. 44, a case of malignant tumour with ascites, complicated by the presence of a

[1] 'Trans. Clinical Soc.' for 1886, vol. xix, p. 209.

greatly enlarged liver and extensive general anasarca, died on the third day from what appeared to be simple exhaustion.

The two remaining cases both died from the immediate effects of very severe and prolonged operations.

No. 93 was one of rapidly growing malignant dermoid tumour with universal adhesions. The patient never rallied fully from the shock, remaining extremely prostrate, with a barely perceptible pulse. She grew steadily weaker, and died thirty-six hours after operation.

No. 96. The removal of a semi-solid tumour was greatly complicated by universal adhesions, including very extensive intestinal connections. After regaining consciousness the patient seemed fairly well but for the fact of an extremely feeble circulation, which was quite unaffected by stimulants. She became gradually comatose, and died on the second day.

In three out of these ten fatal cases death was directly due to preventable causes,—Nos. 31, 53, and 90. For these fatalities I entirely blame myself. The remaining seven resulted from causes more or less beyond my control, but I trust that the lesson learnt from each one of them may prove of help to me in dealing more successfully with similar conditions in the future.

Table II contains twelve cases of removal of one or both uterine appendages for disease connected with persistent suffering.

All of these patients recovered, and, with the exception of one (No. 7) who died eleven months after operation from acute tuberculosis, all were in good health when last heard from. The report appended under the heading of Ultimate Result has in every instance been obtained direct from the patient herself.

Nine out of the twelve were chronic cases with a history of more or less constant suffering of from two to ten years' duration, and in none of these was operative interference undertaken until a prolonged trial of other treatment had failed completely either in my own hands, or in those of

someone on whose statements with regard to this point I could fully rely.

The three remaining cases, Nos. 7, 11, and 12, were operated on for the relief of acute symptoms of comparatively recent date (see Table).

In seven of the patients (four married and three single women) both appendages were removed, the operation in each instance being followed by entire relief from pain and by complete arrest of menstruation. A like result was obtained by the removal of the remaining ovary in the married woman (No. 7) who had previously undergone ovariotomy.

Among the four other patients, from whom only one appendage was taken away, the second ovary was found healthy in two (one married and one single woman), who have since menstruated without pain. In the remaining cases (both married women, Nos. 9 and 12), the second ovary, although diseased, was not removed for the reasons stated in the Table.

Some experience in the management of these cases of chronic ovarian mischief has led me to the opinion that the pain accompanying them, which may amount to severe and almost constant suffering in hospital patients who are compelled to work for their living, can in most instances be considerably alleviated by the use of purgatives. Roughly estimating, I should say that from 80 to 90 per cent. of such cases are the subjects of more or less obstinate constipation, due in great measure, I believe, to dread of the pain experienced during defæcation from the pressure then exerted upon the prolapsed and often exquisitely tende- ovaries.

Under such conditions a judicious course of tonic purgative treatment, by lessening pelvic congestion and preventing the formation and passage of scybala, is usually followed by marked relief of symptoms with a corresponding improvement in general health.

In a certain small proportion of cases, however, including especially those complicated by suppurative or hæmorrhagic

disease of the tubes, any mode of treatment short of operation fails ultimately in affording relief. The pain, originally confined to the menstrual periods, recurs with varying intensity during the intervals, becoming gradually more and more persistent in character, while constantly aggravated by exertion of any kind.

In cases of this nature, where tangible evidence of disease involving the uterine appendages exists, I believe that operative interference, as a last resort, is occasionally justifiable, and, moreover, likely to prove successful as regards ultimate restoration to health.

The operation is, however, one which, for obvious reasons, should be most carefully limited in its application; and, even when advocated in properly selected instances, it should never, in my opinion, be undertaken until the patient and her husband (or nearest relative if she be unmarried) have been made to fully appreciate not only the immediate risk to life entailed by the contemplated procedure, but also the possible consequences involved with regard to her future in all its bearings.

Table III requires but brief mention, as the details therein given sufficiently explain the nature and consequences of the operations recorded in it. Among the incomplete cases are included the only two instances in which I have as yet failed in the attempted removal of an ovarian tumour. Both of these patients had been tapped, and the death of the second one, who was the subject of a very large multilocular growth, was directly due to the difficulties encountered in the attempt to separate universal adhesions which had resulted from this treatment.

In tracing the main factors which have led to the increasing success of abdominal section during the past ten years, one cannot fail to be impressed by the marked decrease in the number of deaths from *septicæmia*—a cause which formerly figured so largely in the mortality of ovariotomy.

For purposes of comparison I will take three groups of operations as illustrative of this fact.

The *first* of these, consisting of 100 cases, numbered con-

secutively from 701 to 800, is contained in the record of 1000 completed ovariotomies in Sir Spencer Wells's work on 'Ovarian and Uterine Tumours' (edition of 1882, pp. 378 to 382). My object in selecting this special series is to show the mortality from septicæmia which prevailed *during* the use of the clamp, and *previously* to the employment of antiseptics in abdominal surgery.

The *second* group consists of 150 ovariotomies recorded by Mr. Thornton in the sixty-fourth volume of our 'Transactions' (pp. 139 to 161). All of these cases were treated by intraperitoneal ligature of the pedicle, and the operations were, moreover, performed with antiseptic precautions.

The *third* group contains my own present series of 104 ovariotomies.

The following figures will show the average death-rate from *septicæmia alone* in these three groups, representing three successive periods during the last twelve years:

I. 1875—76. 100 cases, 10 deaths, or 1 to every 10 patients.

II. 1877—80. 150 cases, 5 deaths, or 1 to every 30 patients.

III. 1881—87. 104 cases, 2 deaths, or one to every 52 patients.

These results certainly tend to prove that one great cause of the former mortality following ovariotomy has now to a great extent been brought under control, and this fact has undoubtedly influenced the general death-rate in all departments of abdominal surgery.

It only remains for me in conclusion to enumerate the chief factors which, in my opinion, have contributed to this increased success. These are:

1. The general adoption of the intraperitoneal treatment of the ovarian pedicle.

2. The application of the antiseptic system to abdominal surgery.

3. The gradual abandonment of the practice of tapping abdominal cysts.

4. The increase in our knowledge respecting the proper use and management of the drainage-tube.

5. And, lastly, the recent introduction of the plan of washing out the peritoneal cavity in cases complicated by the extravasation of blood or other fluids.

Note.

Since reading the above I have discontinued the use of the spray, while still employing carbolic acid for instruments, silk, and sponges; and the result of my past twelve months' experience fully confirms me in the wisdom of this step.

TABLE I.—*One Hundred and Four Completed Ovariotomies.*

No.	Place of operation.	Date of operation.	Age.	Condition.	Adhesions.	Ovary removed.	Treatment of pedicle.	Weight of tumour.	Special treatment, or special features of case.	Immediate result.	Subsequent history and remarks.
		1881						lbs.			
1	Samaritan Hosp.	Jan.	29	M.	Parietal and pelvic	Right	Enucleatn. and ligs.	14	Papillomatous cyst	Recovered	Child born 18 months later. Continues well.
2	Nursing Home	Feb.	27	M.	Parietal	Left	Ligatures	29	Papillomatous cyst	Recovered	Child in Sept., 1883, 2nd ovary removed in May, 1886. Vide Table II.
3	Samaritan Hosp.	April	37	M.	None	Right	Ligatures	16	Two perfectly distinct unilocular cysts, encapsuled in right broad ligament	Recovered	Continues well.
4	Ditto	June	33	M.	None	Left	Ligatures	21	Broad - ligament cyst	Recovered	—
5	Ditto	July	48	M.	Extensive parietal and intestinal	Right	Ligatures	36	Had been tapped 4 months previously	Recovered	Continues well.
6	Ditto	Aug.	27	S.	Extensive parietal	Right	Ligatures	26	—	Recovered	Continues well.
7	Ditto	Oct.	33	M.	None	Right	Enucleatn. and ligs.	11	—	Recovered	Continues well.
8	Ditto	Oct.	34	S.	Parietal and intestinal	Left	Ligatures	25	—	Recovered	Continues well.
9	Nursing Home	Oct.	50	M.	None	Right	Ligatures	11	—	Recovered	Died a year later of uterine cancer.
10	Samaritan Hosp.	Nov.	26	S.	Close pelvic (uterine)	Right	Enucleatn. and ligs.	8	—	Recovered	Married 6 months later. Child born in 1882. Continues well.
11	Ditto	Dec.	32	M.	None	Right	Ligatures	11	—	Recovered	Continues well.
		1882									
12	Ditto	Jan.	53	W.	None	Right	Ligatures	34	—	Recovered	Continues well.
13	Ditto	Feb.	48	S.	Extensive parietal and omental	Left	Ligatures	17	Papillomatous cyst	Recovered	Well in 1886.

14	Ditto	April	41	M.	Universal parietal, pelvic, omental, and intestinal	Right	Enucleatn. and ligs.	14	Suppurating cyst, twisted pedicle. Drainage	Died 4th day (septicæmia)	Temp. 103° before operation. Cyst contained 18 pints of putrid pus.
15	Ditto	April	54	S.	Parietal, intestinal and pelvic	Left	Enucleatn.	47	Had been tapped 9 weeks before	Died 5th day (exhaustion)	Chronic bronchitis. Death due to general pulmonary œdema.
16	Ditto	May	27	S.	None	Right	Ligatures	11	Papillomatous cyst	Recovered	—
17	New Hosp. for Women	May	47	S.	None	Right	Ligatures	9	—	Recovered	—
18	Samaritan Hosp.	May	40	M.	None	Left	Ligatures	8½	—	Recovered	Child born 10 months after operation. Continues well.
19	Private House	June	36	M.	Omental	Right	Ligatures	8	Papillomatous cyst	Recovered	Continues well.
20	Samaritan Hosp.	June	30	M.	Extensive parietal, omental, and intestinal	Left	Ligatures	38	—	Recovered	—
21	Ditto	July	40	S.	None	Both	Ligatures	25	2 large cystomata	Recovered	Continues well.
22	Ditto	Aug.	62	M.	Extensive parietal and omental	Right	Ligatures	47	Had been thrice tapped	Recovered	Well in 1887.
23	Ditto	Oct.	38	S.	None	Both	Ligatures	10	—	Recovered	—
24	Ditto	Oct.	24	M.	Parietal	Right	Ligatures	5	Twisted pedicle ...	Recovered	Continues well. Child in 1883.
25	Ditto	Oct.	29	S.	None	Left	Ligatures	16	—	Recovered	—
26	Nursing Home	Nov.	54	S.	Very firm and extensive parietal, vesical, and omental	Right	Ligatures	67	Tumour had existed for 9 years before removal	Recovered	Attack of temporary insanity on return home, lasted 6 weeks. Excellent health, bodily and mental, in March, 1884. Continues well.
27	Samaritan Hosp.	Dec.	54	M.	General parietal and pelvic	Right	Enucleatn. and ligs.	33	—	Recovered	Continues well.
28	Ditto	Dec. 1883	53	M.	None	Right	Ligatures	37	—	Recovered	Continues well.
29	Ditto	April	50	S.	Pelvic and uterine	Both	Ligatures	18	Two tumours, both papillomatous. Ascites	Recovered	A large umbilical protrusion, and 2 hernial sacs situated one above the other in the middle line, were excised. Continues well.

No.	Place of operation.	Date of operation.	Age.	Condition.	Adhesions.	Ovary removed.	Treatment of pedicle.	Weight of tumour.	Special treatment, or special features of case.	Immediate result.	Subsequent history and remarks.
		1883						lbs.			
30	Nursing Home	May	30	S.	Pelvic	Right	Ligatures	15	—	Recovered	—
31	Samaritan Hosp.	May	33	M.	None	Right	Ligatures	13	—	Died 7th day (septicæmia)	Septic infection through sponges used at operation.
32	Ditto	May	39	M.	None	Right	Ligatures	11	—	Recovered	—
33	Nursing Home	June	53	S.	None	Right	Ligatures	5	—	Recovered	Continues well.
34	Samaritan Hosp.	June	51	M.	None	Right	Ligatures	5	—	Recovered	Continues well.
35	Nursing Home	June	23	S.	None	Right	Ligatures	9	Broad - ligament cyst	Recovered	Continues well.
36	Samaritan Hosp.	June	54	M.	Parietal, omental, and intestinal	Right	Ligatures	17	Perchloride of iron to torn parietal adhesions	Recovered	Convalescence retarded by abscess in abdominal wall. Well in 1886.
37	Nursing Home	June	40	M.	None	Right	Ligatures	7	—	Recovered	Patient syphilitic. Continues well.
38	Nursing Home	July	64	M.	None	Left	Ligatures	30	Very thin-walled rotten cyst. Five inches of fat in abdominal wall	Recovered	An enormously stout woman with general anasarca. Bedridden for 2 years before operation. Well in 1885.
39	Ditto	Aug.	27	S.	None	Left	Ligatures	11	—	Recovered	Continues well.
40	Samaritan Hosp.	Oct.	37	S.	Extensive omental and intestinal	Left	Ligatures	24	Suppurating cyst; twisted pedicle	Recovered	Continues well.
41	Ditto	Oct.	41	M.	Pelvic and uterine	Left	Enucleatn. and ligs.	26	—	Recovered	Continues well.
42	Ditto	Nov.	48	M.	Firm parietal, omental, and intestinal	Right	Ligatures	21	Drainage (48 hrs.)	Recovered	Well in 1887.

43	Ditto	Dec.	37	M.	Parietal and pelvic, omental and intestinal	Left	Ligatures	13	Several ligatures to bleeding points on intestine	Recovered	*Right* parotid swelling on 8th day. Continues well.
44	Nursing Home	Dec.	53	S.	None	Left	Ligatures	12	A soft semi-solid, tumour (? malignant). Ascites and a greatly enlarged liver. Drainage	Died 3rd day (exhaustion)	Had been twice tapped. No P.M. examination obtainable.
45	Private House	Dec.	45	M.	Omental	Right	Ligatures	14	—	Recovered	Died in June, 1885, of uterine cancer.
46	Nursing Home	Dec. 1884	55	S.	Parietal and omental	Right	Ligatures	17	—	Recovered	Continues well.
47	Samaritan Hosp.	Jan.	36	M.	Parietal, omental, and intestinal	Left	Ligatures	39	Twisted pedicle ...	Recovered	Died of pneumonia in April, 1884.
48	Nursing Home	Feb.	35	S.	None	Both	Ligatures	9	Right broad-ligament cyst. Left ovary cystic	Recovered	Continues well.
49	Samaritan Hosp.	Mar.	48	M.	Very firm parietal	Right	Ligatures	15	Twisted pedicle ...	Recovered	Continues well.
50	Nursing Home	Mar.	39	M.	None	Both	Ligatures	4½	Left broad-ligament cyst. Right ovary cystic	Recovered	Continues well.
*											
51	Samaritan Hosp.	April	40	M.	None	Right	Ligatures	6½	—	Recovered	Well in 1886.
52	Ditto	May	36	M.	None	Right	Enucleatn. and ligs.	8½	Broad-ligament cyst	Recovered	Well in 1887.
53	Ditto	June	61	M.	Firm pelvic and intestinal	Left	Enucleatn. and ligs.	12	Semi-gangrenous cyst. Drainage (22 hours)	Died 16th day (intestinal obstruction).	P.M.—Ileum adherent to pedicle, and obstructed by a twist.

* The cases down to this line were published in the 'British Medical Journal,' August 9th, 1884, but are here given in order to complete the series of operations up to end of 1887. The same applies to the cases marked with an asterisk in Tables II and III.

No.	Place of operation	Date of operation.	Age.	Condition.	Adhesions.	Ovary removed.	Treatment of pedicle.	Weight of tumour.	Special treatment, or special features of case.	Immediate result.	Subsequent history and remarks.
		1884						lbs.			
54	Samaritan Hosp.	June	34	M.	None	Left	Enucleatn. and ligs.	5	Cyst completely encapsuled in broad ligament	Recovered	—
55	Ditto	July	25	S.	None	Both	Enucleatn. and ligs.	4	—	Recovered	Continues well.
56	Nursing Home	Aug.	59	S.	None	Left	Ligatures	15	—	Recovered	Well in 1885.
57	Ditto	Oct.	42	S.	None	Right	Ligatures	6½	—	Recovered	Continues well.
58	Ditto	Oct.	68	W.	None	Right	Ligatures	23	Flaccid cyst; fluid laden with cholesterine	Recovered	Had been tapped in 1859; no reaccumulation until within 2 years of operation. Continues well.
59	Samaritan Hosp.	Oct.	44	M.	None	Right	Enucleatn. and ligs.	15	Broad - ligament cyst	Recovered	Continues well.
60	Ditto	Nov.	48	S.	Omental	Both	Ligatures	13	Outgrowth removed from fibroid uterus	Died 9th day (exhaustion)	Persistent dysenteric diarrhœa. P.M.—Extensive ulceration of colon. Both kidneys much diseased.
		1885									
61	Nursing Home	Jan.	39	S.	Omental	Both	Ligatures	3½	—	Recovered	Continues well.
62	Samaritan Hosp.	Jan.	19	S.	Parietal	Both	Ligatures	34	Semi-solid tumour, malignant. Left ovary cystic	Recovered	Had been thrice tapped. Died within the year of malignant recurrence.
63	Ditto	Feb.	65	W.	None	Right	Ligatures	12	—	Recovered	Continues well.
64	Ditto	March	37	M.	Universal: parietal, omental, intestinal and mesenteric	Left	Ligatures	10	Gangrenous cyst with hæmorrhagic contents. Twisted pedicle	Recovered	Had been confined 4½ weeks; cyst tapped 10 days before removal. Child born in 1886. Continues well.
65	Ditto	March	42	M.	None	Right	Ligatures	16	—	Recovered	Continues well.
66	New Hosp. for Women	April	30	S.	Pelvic	Both	Ligatures	10	Left ovary adherent in Douglas's pouch	Recovered	Well in 1887.

67	Samaritan Hosp.	April	58	S.	Parietal, omental, intestinal and pelvic	Both	Ligatures	24	Double cysto-sarcoma. Drainage (24 hours)	Recovered	Abdomen reopened for obstructive symptoms on 8th day. Convalescence slow but complete. (*Vide* vol. xix, 'Clin. Soc. Trans.') Continues well.
68	Nursing Home	April	43	M.	Parietal, intestinal, pelvic (mesenteric and uterine).	Left	Ligatures	11	Rapidly growing cysto-sarcoma. Right ovary atrophic	Recovered	(Nov., 1887.) Patient now dying of malignant recurrence which first showed itself in July, 1886, 16 months after operation.
69	Samaritan Hosp.	May	64	S.	None	Left	Ligatures	17	—	Recovered	Continues well.
70	Nursing Home	May	31	S.	Parietal and pelvic	Both	Ligatures	16	Right ovary firmly adherent in pouch	Recovered	—
71	Samaritan Hosp.	June	29	S.	None	Left	Ligatures	3½	Papillomatous cyst	Recovered	Since married, is pregnant.
72	Ditto	July	19	S.	None	Right	Ligatures	6	—	Recovered	Continues well.
73	Ditto	Oct.	48	M.	Omental	Right	Ligatures	9	—	Recovered	Continues well.
74	New Hosp. for Women	Oct.	53	M.	None	Left	Enucleatn. and ligs.	9	Colloid cyst. Drainage (72 hours)	Recovered	Continues well.
75	Nursing Home	Nov.	58	W.	Intestinal	Left	Enucleatn. and ligs.	16	Cysto-sarcoma with solid base deeply implanted in the broad ligament. Drainage (122 hours)	Recovered	Died 2 months later from rapid recurrence of malignant growth in the pelvis.
76	Samaritan Hosp.	Dec.	42	S.	None	Right	Ligatures	15	—	Recovered	Continues well.
77	Nursing Home	Dec.	68	M.	Parietal	Left	Ligatures	38	Multilocular cyst of rapid growth	Died 3rd day—pulmonary clot	Very feeble with chronic bronchitis. No P.M.
78	Samaritan Hosp.	1886 Jan.	49	M.	Parietal, omental and intestinal	Right	Ligatures	3½	Twisted pedicle. Drainage (30 hours)	Recovered	Well in 1887.
79	Private House	Feb.	29	S.	Pelvic	Both	Ligatures	1	Multilocular cystoma of both ovaries	Recovered	Continues well.

No.	Place of operation	Date of operation.	Age	Condition.	Adhesions.	Ovary removed.	Treatment of pedicle.	Weight of tumour.	Special treatment, or special features of case.	Immediate result.	Subsequent history and remarks.
		1886						lbs.			
80	Nursing Home	Feb.	70	M.	Parietal	Right	Ligatures	26	—	Recovered	Continues well.
81	Samaritan Hosp.	March	66	M.	Parietal and intestinal	Right	Ligatures	24	—	Recovered	Continues well.
82	Nursing Home	April	44	M.	Parietal, omental, mesenteric, pelvic	Left	Enucleatn. and ligs.	67	Patient anasarcous up to nipple line. Lower limbs very œdematous. Drainage (96 hours)	Recovered	Convalescence very tedious. Death from renal dropsy 9 months after operation.
83	Samaritan Hosp.	April	29	S.	None	Left	Ligatures	19	—	Recovered	Continues well.
84	Ditto	June	40	M.	Omental	Right	Ligatures	1	Solid ovarian. Spindle-celled sarcoma	Recovered	Well in July, 1887. No trace of recurrence.
85	Nursing Home	June	44	M.	None	Right	Ligatures	23	—	Recovered	—
86	Samaritan Hosp.	June	42	M.	Rectal	Right	Enucleatn. and ligs.	4½	Multilocular cyst completely encapsuled in broad ligament; right tube much elongated, firmly adherent to surface of rectum. Drainage	Recovered	Very tedious convalescence owing to formation of a rectal fistula, which did not finally close until May, 1887. Seen in good health, Oct., 1887.
87	New Hosp. for Women	July	45	M.	Omental	Left	Ligatures	12	Solid ovarian growth, with a central cavity due to disintegration	Recovered	'Trans. Obstet. Soc.,' 1887.
88	Samaritan Hosp.	Sept.	53	M.	Pelvic and intestinal	Left	Enucleatn. and ligs.	13	—	Recovered	Well in 1887.

89	Ditto	Oct.	33	M.	Parietal and vesical	Left	Ligatures	33	Tumour closely adherent to parietes and to post. wall of bladder, which was drawn up to within 1 in. of umbilicus. Drainage (72 hours)	Recovered	Bladder wounded in abdominal incision; opening closed by continuous silk suture. Rapid convalescence. Seen in excellent health Oct., 1887.
90	Ditto	Oct.	36	S.	None	Both	Ligatures	11	—	Died (13 hours), haemorrhage	Ligature slipped.
91	Ditto	Nov.	50	M.	Vesical and pelvic	Right	Enucleatn. and ligs.	10½	Drainage (32 hrs.)	Recovered	Continues well.
92	Ditto	Nov.	25	S.	None	Right	Ligatures	14	Broad-ligament cyst	Recovered	Continues well.
93	Ditto	1887 Jan.	42	M.	Universal	Left	Enucleatn. and ligs.	24	Multilocular dermoid (malignant). Drainage	Died (36 hours), exhaustion	P.M. — Abdominal condition satisfactory.
94	Ditto	March	27	S.	Universal, with much matting of intestines	Both	Ligatures	12	Double multilocular dermoid. Abdomen washed out with boiled water. Drainage (72 hrs.)	Recovered	Convalescence much retarded after 2nd week by attack of intestinal obstruction. In excellent health Oct., 1887.
95	Nursing Home	March	29	M.	None	Right	Ligatures	1½	Dermoid cyst	Recovered	Remains well.
96	Ditto	April	63	M.	Parietal, omental, intestinal, and pelvic	Left	Ligatures	15	Multilocular very glandular tumour of long standing. Drainage	Died (48 hours), exhaustion	Patient very feeble; gradually became comatose.
97	Samaritan Hosp.	May	23	S.	None	Both	Ligatures	9	—	Recovered	Remains well.
98	New Hosp. for Women	May	44	M.	None	Both	Enucleatn. and ligs.	8	Dermoid cyst embedded in broad ligament. Left ovary contained a simple cyst size of bantam's egg	Recovered	—

No.	Place of operation.	Date of operation.	Age.	Condition.	Adhesions.	Ovary removed.	Treatment of pedicle.	Weight of tumour.	Special treatment, or special features of case.	Immediate result.	Subsequent history and remarks.
		1887						lbs.			
99	Samaritan Hosp.	May	42	M.	Parietal	Right	Ligatures	11	Semi-solid tumour	Recovered	Remains well.
100	Nursing Home	May	47	S.	None	Left	Enucleatn. and ligs.	2	Solid growth completely encapsuled in broad ligament	Recovered	Remains well.
101	Samaritan Hosp.	Sept.	47	M.	Omental and intestinal	Right	Enucleatn. and ligs.	3½	Dermoid cyst. Drainage (36 hrs.)	Recovered	Remains well.
102	Ditto	Oct.	27	S.	None	Left	Ligatures	22	—	Recovered	Remains well.
103	Ditto	Nov.	41	S.	Omental and intestinal	Right	Ligatures	6½	Dermoid cyst with twisted pedicle. Drainage (36 hrs.)	Recovered	Remains well.
104	Nursing Home	Nov.	48	S.	Extensive parietal	Right	Ligatures	23	Had been twice tapped. Drainage (60 hours)	Recovered	Remains well.

TABLE II.—*Twelve Operations for the Removal of Diseased Uterine Appendages.*

No.	Date of operation.	Place of operation.	Age, condition.	Previous history and reasons for operation.	Ovary removed.	Condition of ovaries and tubes.	Immediate result.	Ultimate result.
1 *	Oct., 1883	New Hosp. for Women	26 M.	Catamenia at 12. Married at 19. Miscarriage 3 months later. Child born 10 months after this. Severe dysmenorrhœa of 6 years' standing	Both	Large œdematous ovaries prolapsed and firmly adherent in pouch. Tubes undilated	Recovered	Menstruation arrested, and pain entirely relieved by operation. Health excellent (July, 1886).

2	Nov., 1883	Ditto	20 S.	Cat. at 12. Normal until age of 16, thenceforth scanty and irregular, with constantly increasing suffering	Both	Cystic ovaries, the left adherent to rectum. Tubes healthy	Recovered	Seen in good health, free from pain and able to work (Oct., 1887). No return of menstruation.
3	Jan., 1885	Samaritan Hosp.	30 M.	Cat. at 14, always painful. Married at 18. Never pregnant. Pain increasing and becoming constant; unable to earn livelihood	Both	Small cirrhotic ovaries, the left one adherent in Douglas's pouch. Tubes normal	Recovered	Seen in excellent health (Oct., 1887). No return of pain. Has not menstruated.
4	March, 1886	Ditto	33 M.	Cat. at 13. Married at 19. 7 children, 3 miscarriages. Severe dysmenorrhœa since birth of last child, 3 years before	Left	Cystic ovary adherent in pouch. Left pyosalpinx. Right ovary healthy	Recovered	Seen in good health, and free from pain (Oct., 1887).
5	April, 1886	Nursing Home	34 S.	Cat. at 13, always painful. A confirmed invalid, the subject of angular curvature; bedridden for 6 years, with almost constant suffering. Terribly emaciated by chronic vomiting	Both	Cystic ovaries, left one adherent. Tubes normal	Recovered	Pain and sickness entirely relieved by operation. No return of menstruation. In good general health, and slowly regaining power in back and legs (Nov., 1887).
6	May, 1886	Samaritan Hosp.	27 S.	Cat. at 14. Normal until 3 years ago, since which date she has suffered from constantly increasing dysmenorrhœa	Both	Cystic ovaries adherent in Douglas's pouch. Tubes healthy	Recovered	Has lost all pain, and is gaining flesh (Oct., 1887). No return of menstruation.
7	May, 1886	Nursing Home	33 M.	Ovariotomy (left) in 1881. (*Vide* Table I.) Continued well until 3 months before second operation, when she was seized with acute pelvic pain which confined her to bed	Right	Ovary œdematous, contained a blood-cyst of the size of a cherry. Tube normal	Recovered	Was in usual health and free from pain 5 months after operation. Died in 1887 of acute tuberculosis.
8	May, 1886	Ditto	27 S.	Cat. at 15. Normal until age of 20, from which date there has been constantly increasing suffering from dysmennorrhœa	Left	Large cystic ovary, tube normal. Right ovary healthy	Recovered	Seen in good health (July, 1887). Menstruation normal, without pain.

No.	Date of operation.	Place of operation.	Age, condition.	Previous history and reasons for operation.	Ovary removed.	Condition of ovaries and tubes.	Immediate result.	Ultimate result.
9	Oct., 1886	Samaritan Hosp.	32 M.	Cat. at 20. Married at 21. Never pregnant. Had been suffering severely for 2 years previous to operation	Right	Cystic ovary, enveloped in omental and parietal adhesions. Tube healthy. Left ovary firmly adherent on surface of rectum, not removed	Recovered	Entire relief for 12 months after operation. Has latterly had some return of pain, referred to the left ovary (Dec., 1887).
10	July, 1887	Ditto	36 M.	Cat. at 14. Married at 25. Never pregnant. Severe dysmenorrhœa of 5 years' duration	Both	Double hydrosalpinx with adhesions to small cirrhotic ovaries	Recovered	No return of pain since operation. Has not menstruated. In excellent health (Nov., 1887).
11	Oct., 1887	Ditto	34 M.	Cat. at 13. Married at 19. Six children, 1 miscarriage. Menstruation normal until 10 weeks ago, when she was seized with sudden pain during the flow. Pain has continued ever since, accompanied by frequent coloured discharge	Both	Right hæmatosalpinx, size of Tangerine orange, adherent in pelvis, with cystic ovary. Left ovary cystic; tube normal. Washed out. Drainage, 36 hours	Recovered	Quite well in Jan., 1888. Has not menstruated.
12	Nov., 1887	Ditto	34 M.	Cat. at 13. Married at 18. Six children. Severe dysmenorrhœa for 5 months past, with loss of flesh. Pelvic pain latterly continuous, confining her to bed	Left	Hæmatosalpinx bound down in pouch with small cystic ovary. Right ovary immovably fixed by malignant disease, involving cæcum and vermiform appendix. Washed out. Drainage, 36 hours	Recovered	Pain entirely relieved by operation. General health fairly good (Jan., 1888).

TABLE III.—*Four Incomplete Operations.*

No.	Date of operation.	Place of operation.	Age.	Condition.	Nature of disease and details of operation.	Result.	After-history.
1 *	Nov., 1882	Samaritan Hosp.	30	M.	Suppurating ovarian cyst, universally adherent, containing 15 pints of puriform fluid; evacuated and drained. Patient had been tapped 3 weeks before	Recovery	Well in March, 1884. Has not since been heard of.
2 *	March, 1883	Private House	35	M.	Multilocular semi-solid ovarian tumour of very rapid growth, universally adherent, and closely connected with intestine. Had been tapped 6 times. Patient died before the operation was completed	Death (shock)	—
3	Oct., 1886	Samaritan Hosp.	40	M.	Right pyosalpinx, containing 6 pints, evacuated and drained. Patient, moribund before operation, survived it by only 24 hours	Death (exhaustion)	—
4	Nov., 1886	Nursing Home	68	W.	Retroperitoneal cyst, evacuated and drained. Malignant disease of liver discovered at operation	Recovery	Died of cancer shortly after her return home.
					Six Exploratory Incisions.		
1 *	July, 1882	Nursing Home	61	M.	16 pints of ascitic fluid. No disease of pelvic or abdominal organs. Peritoneum thickened but otherwise healthy. Bowels loaded with scybala	Recovery	Heard of in good health 2 years after operation.
2 *	July, 1883	Samaritan Hosp.	42	S.	24 pints of free fluid. General papillomatous disease of the peritoneum	Recovery	Died in March, 1884.
3 *	Feb., 1884	Ditto	52	M.	24 pints of mixed ascitic and ovarian fluids due to sprouting masses of papilloma around tapping puncture in small ovarian cyst. Peritoneum extensively infected	Recovery	Died 6 months later.
4	June, 1885	New Hosp. for Women	34	M.	Rapidly growing pelvic cancer of extraperitoneal origin. Uterus and appendages healthy. Secondary growths in omentum	Death (exhaustion)	—
5	Nov., 1885	Samaritan Hosp.	33	M.	Abdomen opened for removal of uterine appendages. Pelvic contents so matted together by old inflammatory adhesions that further interference seemed unjustifiable	Recovery	Operation followed by some relief from pain. Patient now has an ovarian cyst, size of a fœtal head (Dec., 1887).
6	May, 1886	Ditto	25	S.	General tubercular disease of the peritoneum, with encysted fluid	Death (exhaustion)	—

(For report of the discussion on this paper, see 'Proceedings of the Royal Medical and Chirurgical Society,' Third Series, vol. i, p. 1.)

ARTHRECTOMY; ERASION OF JOINTS.

BY

EDMUND OWEN, M.B., F.R.C.S.,

SURGEON TO ST. MARY'S HOSPITAL, AND SENIOR SURGEON TO THE HOSPITAL FOR SICK CHILDREN, GREAT ORMOND STREET.

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THE operation of scraping a diseased tissue cannot be reckoned as altogether a new procedure in surgery, but in the last few years it has been so thoroughly systematised, and so extensively employed, and that in such a variety of conditions, that practically it may be classed amongst the most recent of the advances of our art.

With its adoption in lupus, chronic ulcer, and carbuncle I have no concern in this paper; I propose to call attention to its practical value in the treatment of chronic joint disease, and especially in the case of the knee, in which I have employed it in a considerable number of cases, and with a gratifying amount of success. As regards its application in the case of chronic disease of the hip- and ankle-joints I can speak neither with decision nor confidence. In the case of chronic hip disease erasion cannot be adopted as a special and an individual operation, for the conformation of that joint demands excision of at least the head of the femur before the articular recesses can be effectually dealt with by scraping. Thus erasion becomes a supplementary

knee the inflammatory process be associated with specific micro-organisms, the surgeon now deals with the tissues with almost as much determination as if they were invaded by a sarcomatous infiltration. And, beyond a doubt, the improvement which he recognises in his results is to a very large extent the direct outcome of the bacillary theory. In every case of chronic and intractable disease of the knee, in which an operation is demanded, he either assumes the presence of harmful micro-organisms, or apprehends their speedy invasion; and in the simple chronic synovitis of the strumous subject he recognises the pre-bacillary stage of a tubercular inflammation. That the bacilli may long remain localised and comparatively harmless in a swollen knee is an obvious fact, but there is no telling how soon almost every organ in the body may be secondarily affected by them. The sooner, therefore, that the joint is freed of them the better for the health and safety of the patient.

According to the present theory, there is a meanness characterising these tubercle bacilli:—Received into the blood, they flow with the stream and take no notice of the healthy tissues through which they circulate, but, searching for the weak spot of the individual, they seize upon it and involve it in a specific and destructive inflammation. In one it is a weak, catarrhal patch of lung, in another it is the tissue of the ischio-rectal fossa, and in a third it is the synovial membrane of the knee, which some months previously had been damaged by a fall or sprain. There was an old superstition to the effect that a tuberculous fistula *in ano*, or a lupoid ulceration, had better not be cured, lest on the cessation of the discharge from that sore, pulmonary phthisis should be developed. If there be any truth in this superstition, can it now be explained on the idea that when the diseased tissue had been cured it was thereby strengthened to such an extent that it became less weak, and, therefore, less vulnerable than the catarrhal lung, which the evicted bacilli thereupon invaded? At any rate the thought enables me to insist with energy that when the surgeon proceeds to attack a bacillary colony he

must smite it root and branch, he must scrape and scrub as if success depended on leaving not a single living germ behind.

After having operated on these lines I have in several cases been fairly astonished at the marked improvement which the patient has undergone both in appearance and general condition. Within a day or two after performing an extensive arthrectomy, I have witnessed a change for the better in the subject as unmistakable as that which often follows a complete operation for the removal of malignant disease. I am not referring to those cases in which a joint was attacked because it was tense and suppurating, for then the comfort would likely be due to the relief afforded to sensory nerves, but I have in view a class of cases in which there was no very active change, no great local disturbance, and in which the improvement seemed to be due simply to the removal of certain elements which were prejudicial to the well-being of the patient.

For a few days previous to the operation the child should be carefully watched, his urine being tested and his temperature taken. A rising temperature may foretell an attack of measles or scarlet fever, and should at any rate be taken as evidence of the advisability of temporarily postponing the operation; so also with regard to an attack of sickness or loss of appetite. In short, though one cannot always pick one's cases, one should at any rate deal with them in the most favorable conditions attainable.

A back splint with a rectangular foot-piece should be duly provided, and supplemented by a bracketed outside splint which is long enough to reach into the arm-pit. The back splint may be covered with a thick padding in three pieces, the upper and lower of which are fixed, whilst the shortest of the three, which lies behind the knee, is movable, so that it may be slipped out for dressing the part.

By way of preparation for the operation the limb is thoroughly cleansed with soap and water, and then washed with carbolic lotion or with a mercuric solution of 1 in 1000; and until the incision is made, the region of the

knee had better be swathed in cloths wet with the antiseptic solution, after the manner of Lister.

It is not advisable to employ Esmarch's band or tourniquet; it is better to deal with bleeding vessels as they are encountered rather than to find a number of them requiring attention at the same moment on the completion of the operation. Moreover, the general oozing is much more fierce on the removal of the band than it would have been at any time during the operation had no compression been used. The truth of this remark is borne out by the rush of blood into the cutaneous capillaries which one notices whenever an elastic bandage is removed from a limb. The flow of blood into the tissues is reactionary.

The operation is commenced by making a bold horse-shoe incision from the tuberosity of one femoral condyle nearly to the tubercle of the tibia, and up to the other tuberosity of the femur. This incision opens the joint and divides the ligament of the patella. Bleeding vessels are caught by the self-holding forceps.

The crescentic flap with the patella is then turned up, and if the subcrural pouch of the articular cavity is not thereon fully exposed, the horns of the incision may be prolonged upwards to the necessary extent. Every ulcerated surface of articular cartilage or bone is then scraped over or scraped out, all pellets and fringes of synovial membrane are sliced off with curved scissors or scalpel, the semilunar cartilages are taken away, and the crucial ligaments are dissected out. The end of the femur is then thrust out of the wound, and the posterior surface of its condyles, and the synovial recesses above them, and the posterior part of the capsule of the joint are thoroughly scraped. (When scraping the front of Winslow's ligament the azygos artery is likely to be wounded and to bleed somewhat vigorously.) The subcrural pouch is then thoroughly explored and scraped; the articular surface of the patella is also scraped, and if it be much affected it may be sliced off, but the bone should not be taken away.

When, to the entire satisfaction of the surgeon and his

assistant, every suspicious area has been efficiently dealt with, the large cavity is thoroughly washed out with a hot solution of chloride of zinc or carbolic acid.

If the head of the tibia has been long displaced on to the outer femoral condyle, and the scraping which its inner tuberosity has received does not suffice to allow of the leg being adjusted in a perfectly straight line—and this often happens—the articular surface of the inner femoral condyle must be sliced away until the desired position is attainable; certainly the bones must not be allowed to become ankylosed with a valgous inclination.

Provision is then to be made for efficient drainage; upon this much of the ultimate success of the operation depends. And as the cornua of the wound cannot be depended upon for draining the post-condylar recesses, I am in the habit of boring a hole from inside the joint through the ligament of Winslow, using a pair of scissors for the purpose. The position of the popliteal artery having been made out, the index finger of the left hand is lodged in the hollow along the inner side of the biceps tendon, and the skin is traversed at that spot. Occasionally, I have drained through the space between the artery and the inner hamstrings; it matters not where the drain is so long as it is efficient. Pus cannot drain uphill. If the tube be passed from the anterior and through the posterior wound, heed must be given that it is not nipped between the femur and tibia when the limb is brought straight. On the whole it is perhaps better to drain solely by the posterior opening, closing the anterior wound entirely with the exception of its cornua.

The limb is then bandaged from the foot upwards, the knee being surrounded by absorbent mercuric wool and fixed upon the straight back splint, care being taken that the heel does not press upon the pad. The less after this that the limb is disturbed the better. The drainage-tube is soon withdrawn, the wearing or starting pains have entirely ceased, and though it must be many months before the limb is serviceable, the disease is probably at an end, and convalescence is established.

Appreciation.—The great advantage which this operation has over excision is that it is essentially a conservative one, in that it does not remove any healthy tissue, whilst at the same time it is an extremely radical one, in that it ensures the taking away of all material of a dangerous or suspicious nature. In the old classical operation of excision, if there were an ulceration on the posterior surface of the external condyle of the femur—a very likely situation for one—both condyles were sawn off from the front until the plane of section emerged above the level of the carious patch. And so also with regard to the tibia, layer after layer of bone was sliced away until a perfectly trustworthy surface was exposed; the result being that not only was there a needless sacrifice of valuable tissue, but also that in certain cases the junction cartilage was unnecessarily trenched upon and even removed.

Such serious interference with the most important growth-centres of the femur and tibia could not but entail a lamentable shortness of the future limb; and though the result of the operation probably found a record amongst the "successful cases" in the surgeon's note-book, it was by no means the best result attainable in the circumstances. After a carefully performed arthrectomy, the amount of shortening of the limb should be almost inappreciable. It is, of course, too early yet to speak with absolute certainty upon this matter, but so far as my experience goes at present, the promise which the operation holds out is most satisfactory.

If the process of healing go on well, the temperature keeping low, and the patient prospering in every way, there is no need for interference or for changing the dressings. But if, as sometimes happens, the discharge continue, and granulations spring up around some of the cloacæ, or around unclosed parts of the operation-wound, and if at the same time the patient do not manifest a decided improvement, the attack upon the lingering elements of disease must be renewed. In some of my cases I have repeated the erasion a third or fourth time, and have succeeded at last in

leaving the parts ready for perfect consolidation. In some instances I feel sure, as I look back, that I have waited too long before renewing the attack; a few weeks should amply suffice to show if fresh erasion is needed, and in which individual part of the articular area it should be prosecuted, for it is scarcely necessary to say that the entire wound does not require opening up. Indeed, it often happens that these secondary operations are of almost trivial importance, and yet they may suffice to give the finishing touch to a somewhat unpromising case, and to ensure a complete triumph.

Unfortunately it is not every case of pulpy or chronic suppurative disease which yields to erasion, even after several repetitions of the process. Sometimes the measure absolutely fails from the first, and has to be supplemented by amputation. And without resorting to figures, which may be made to prove anything according as they are manipulated, I would give it as a decided opinion that the aid of amputation is not required nearly so often after arthrectomy as after resection. It has been suggested that resection may be resorted to in those very cases in which erasion has failed. To this I would rejoin that arthrectomy, and a repetition of that operation if need be, is not to be looked upon as a measure of lower merit than resection. It offers, indeed, every advantage which resection can hope to supply, whilst, as I have already remarked, it is devoid of one of the greatest disadvantages of resection. This being the case, I fail to see what there is to ensure the survival of the old classical operation. At any rate resection must make room for arthrectomy.

Of course there are conditions in which arthrectomy is contra-indicated, but these apply with equal force to excision. Amongst them are the presence of extensive suppuration about the joint, suggestive of serious and far-reaching disease of the bones,—a suggestion which may be verified by an examination with a stiff probe. Then, when the patient shows signs of general tuberculosis, in the lungs or elsewhere; when enlargement of the liver, or the presence of albumen in the urine gives evidence of

lardaceous disease, and when the patient is in a miserable or exhausted state of health such as calls for amputation.

Modifications of the plan of operation which I have given, and which, I apprehend, is the one usually adopted, have been suggested and employed. Thus some surgeons would open the joint by a transverse incision passing through the patella rather than by the crescentic wound which traverses its ligament. There is nothing, I think, of importance to be urged in favour of this plan, and it has this disadvantage, that if the operator finds the disease further advanced than he anticipated, and wishes thereon to convert the arthrectomy into a resection or an amputation, the transverse incision does not so readily lend itself for that purpose as does the other. Free lateral incisions offer no advantage, whilst the subcrural pouch of the pulpy synovial membrane cannot thoroughly be explored and dealt with through them. Neither is anything gained by opening the joint by an anterior vertical incision, which separates the patella into lateral halves, and splits its ligament. I have tried this plan, and am satisfied that it does not offer the surgeon such a mastery over the synovial crevices and the articular surfaces as does the other. The success of the operation depends upon the thoroughness with which the erasion is carried out; there must be no risk of sacrificing this to the imaginary advantage of avoiding a transverse section of the patellar ligament. This ligament may be left to take care of itself, and if, on completion of the operation, the patellar flap is laid in its proper position, the divided ends of the tendon will become closely united by a strong cicatrix long before the limb is freed from its retentive apparatus.

And this brings me to the important question as to what will be the ultimate condition of the joint. Will it be synostosed? Will it retain a slight amount of movement, or will it perchance recover a range of action equal to that of the sound knee?

After a successful resection of the knee the most perfect result is a solid and stiff joint, and the surgeon aims at

securing this by maintaining the ends of the femur and tibia in close and uninterrupted apposition. On the other hand, after simple incision into, and irrigation of, a knee-joint which is the seat of suppurative synovitis, such as may be treated without removal of articular tissue, one expects to obtain, and in my opinion one usually does obtain, a perfectly movable joint.

After arthrectomy, which, as regards interference with the structural integrity of the joint holds a place midway between resection and incision, or as it is called arthrotomy, we shall be apt to obtain a result which yields neither the free movement of the one nor the stiffness of the other; which this may be must depend upon the amount of interference with the joint tissues, or, in other words, upon the stage to which the disease had advanced when the operation was undertaken.

After excision of the knee the joint which is not found ultimately to be solidly synostosed is likely to be untrustworthy, and might even be deserving of a place amongst the "failures," though possibly the operator might hesitate to place it in that class; but I think that we have yet to determine what is the result to be aimed at after an arthrectomy of ordinary severity. This is a matter on which information is greatly to be desired, and on which no doubt it will in time be forthcoming. After a severe arthrectomy synostosis must be as desirable and inevitable as after resection itself, for the operation of scraping and gouging leaves extensive surfaces of bare bone in mutual contact, in which the less they are disturbed the better. In fact, the limb must be dealt with exactly as after the operation of resection, from which, indeed, it differs only in degree. But in the slighter cases of arthrectomy, should one purposely disturb the limb, trying it and bending it with the view of preventing synostosis, as one deals with the arm and forearm after excision of the elbow-joint? I think not. I hold the opinion that the limb should be kept in absolute extension and perfect rest, even after the simple operation, through a long series of months, lest that movement, per-

chance, be the cause of recrudescence of the disease. If, after a year or more of enforced rest, when the limb is unfettered, it be found that the joint is not absolutely stiff, it may be allowed to resume its function quietly and in its own way. On no account should the surgeon meddle with it with the view of hurrying on a return of articular movement.

If the knee is left by the operator in such a condition as to be eventually capable of resuming its function, this will in no way be frustrated by keeping the limb continuously fixed for a year or more in the extended position. Thomas has long since taught us that it is inflammation, and not the prolonged rest upon a splint, which causes arthritis to be followed by stiffness, and I fear that unless this fact be thoroughly recognised, the operation of arthrectomy in chronic knee disease may suffer at the hands of over-zealous and injudicious friends. But provided only that it can be afforded a fair and deliberate trial, it will be found, I think, to fill an important place in the surgery of the joints, and to enjoy a magnificent future.

APPENDIX OF CASES.

Charles F— (Kenilworth), æt. 8, was admitted to Children's Hospital March 19th, 1886. "Four years ago had scarlet fever; in six months from that, left knee swelled; getting crooked since. Now very puffy; much outward rotation and displacement of tibia; knee flexed at angle of 45°." (A cast was taken.)

May 5th.—Joint laid freely open by curved incision through ligamentum patellæ; much pulpy synovial membrane cut and scraped away; crucial ligaments and semilunar cartilages removed; left condyle of femur and both tuberosities of tibia ulcerated and thoroughly dealt with by sharp spoon. Drain through popliteal space. Zinc-

chloride irrigations; iodoform. Sutures, dressing, and splint as in other cases.

12th.—"Looking well, no pain or fever." Indeed, from the day of the operation this boy began to get well in every sense of the word; he had no rise of temperature or any adverse symptom.

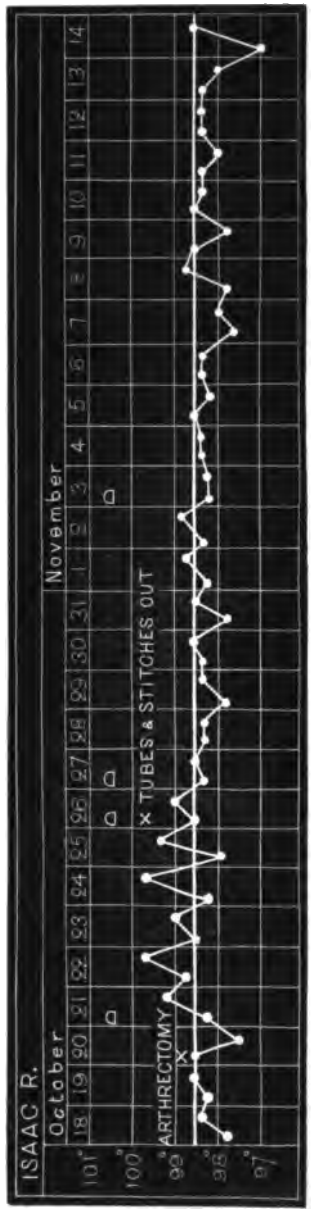
July 21.—"Now gets about with crutches; is much fatter. The sound limb is raised from the ground by a patten, and the left leg hangs so that no pressure is put on heel."

Under date January 20th, 1889, his father writes: "His knee never pains him, and it is about the same size as the other, but he cannot bend it, the leg grows the same length as the other, but we think it a little more bent than it was when he came home. He is very active indeed, and goes to school daily and is becoming a good scholar, and we all feel grateful."

Isaac R— (near Colchester), æt. 11, admitted to Children's Hospital May 29th, 1886. Eighteen months previously he had fallen and hurt his left knee; since then the joint had been steadily increasing in size. For the last year the boy had been growing thinner, but he had no cough. Threefold displacement of tibia; knee globular and contracted at a right angle. He was kept in hospital for nearly two months, and was sent to his home at Walton-on-the-Naze with the limb in gypsum splints, and in a somewhat improved condition.

Readmission September 8th with knee as bad as ever.

On October 20th, 1886, knee opened by horse-shoe incision; found "full of pulpy synovial membrane with grey granulation at edges; large patch of ulceration of condyles of femur. Synovial membrane scraped and cut away, crucial ligaments and semilunar cartilages removed, and articular surfaces of femur, patella, and tibia scraped with sharp spoon. A small portion of internal condyle cut away to allow limb to settle in a straight line." Irrigation with zinc-chloride solution; drainage-tube passed through popli-



Temperature chart of Isaac R— (p. 69).

teal space. Continuous suture; mercuric wool, straight, bracketed splint. Tube removed on 27th. Dressed four times in the month; wound healed "by first intention all round."

Boy left hospital November 10th in greatly improved and extremely promising condition.

Charles H— (Leatherhead), æt. 6, came into St. Mary's Hospital July, 1886. The right knee had first begun to swell after a fall when he was fourteen months old, and it had been bad ever since; he had been an in-patient at Westminster and Charing Cross Hospitals.

The knee was much deformed, and a sinus was discharging behind the biceps tendon. The joint was opened by a semilunar incision and cleaned out, much soft bone being scraped from the femoral condyles; provision was made for drainage; iodoform and mercuric dressings were used, and the limb was fixed on Gant's splint. When the boy left the hospital the condition gave fair promise.

In April, 1887, however, he was again admitted; the knee was looking much better, but discharge was issuing from it by some small sinuses, which, on May 4th, were thoroughly scraped out. Later, a small abscess formed in the popliteal space; this was evacuated and scraped out, but it was not until September 22nd that the boy's condition was such as to warrant his being sent out of hospital.

Dr. Hurd-Wood has been kind enough to find out the boy and to report on him.

Report (February 3rd, 1889).—"Careful measurement gives apparently a quarter of an inch shortening of the right limb between iliac crest and heel. The limb is sound. The boy uses it well, and there is very little if any pain. He never wants to rest it. He looks red and fat, and he could not be in better health.—J. H.-W."

Frederick H— (Aldburn), æt. 6, admitted to Children's Hospital, November 24th, 1886, with chronic purulent discharge from a sinus leading into the left knee-joint. (In the summers of 1885 and 1886 he had been treated in

Savernake Hospital for strumous knee-arthritis.) Tibia much displaced and joint greatly swollen.

January 4th, 1887.—The joint was opened by a straight incision passing vertically down the middle of quadriceps, patella, and ligamentum patellæ; pulpy synovial membrane was cut away and an extensive abscess cavity in the femur was scraped out and the articular surfaces were gone carefully over. The joint was then washed out with the zinc solution and drained through the posterior ligament and the popliteal space. A slice of the internal condyle had then to be removed so that the limb might fall straight against the bracketed splint. Mercuric pads were applied under gentle compression.

Before this operation was performed, the temperature had been varying between 99° and 102° and the boy had been in a most unsatisfactory condition. But although the temperature descended shortly after the operation, and kept much closer to the normal line, still it was evident that the case was not going to turn out well. In spite of the performance of secondary erasions the limb was doomed for amputation, and Mr. Pitts removed it at the end of March, after which the boy made a rapid recovery.

Caroline C— (Antingham), æt. 25, admitted to St. Mary's Hospital on the last day of 1886, had at various times been under treatment for tubercular disease of the right knee; much enlargement and discolouration, two sinuses discharging thin pus from the joint.

January 4th, 1887.—Considering the appearance of the patient as well as the evidently extensive disorganisation of the knee, amputation seemed to be the best treatment; but it was considered that an arthrectomy might be first tried. The joint was found full of granulation tissue, the crucial ligaments had disappeared, and the lower end of the femur was extensively ulcerated. The joint was thoroughly scraped, washed with zinc chloride solution, and dusted with iodoform.

February 21st.—There is a good deal of discharge from

the drainage opening. Temp. 99·2°. The operation incision has practically entirely healed.

March 29th.—Fluctuation on either side of knee; abscesses opened and erasion performed.

April 20th.—Temperature going up to 102° at night; patient failing; amputation; after which the girl made a rapid recovery.

(The knee-joint showed no attempt at repair; there was fatty degeneration of femur and tibia, their ends being covered with flabby granulation tissue.)

Caroline L— (Buckfastleigh), æt. 9 (Hospital for Sick Children, Great Ormond Street, May 20th, 1887). Left knee began to swell, without apparent cause, and without much pain, seven years ago. Had been under treatment most of the time since then—rest, splint, blisters. Lately swelling has been increasing and child has been getting thinner.

On admission.—Knee flexed and much swollen, and leg wasted. Tibia displaced outwards and backwards, and rotated outwards. Not much tenderness, but child resents any attempt at straightening.

June 1st.—Knee opened by horse-shoe incision, articular cartilages ulcerated at edges. Ligaments and synovial membrane greatly thickened; all thickened tissues (including crucial ligaments) cut or scraped away, the condyles of the femur being thrust out and their posterior surfaces, together with the front of Winslow's ligament, being thoroughly scraped over. Irrigation with zinc chloride (gr. x to ℥j). The tendon of biceps had to be divided before the limb could be put straight. A drainage-tube was passed through an opening which was bored with blunt scissors through the outer part of Winslow's ligament, and through the skin which overlay it there. A little had to be shaved off the internal condyle of femur before the limb could be fixed upon the straight back splint; an outside bracketed splint with a rectangular sole-piece was also used.

8th.—"Dressed; since operation temperature has never been above 99° F."

August 18th.—Was discharged. Walking in Thomas's knee-splint by help of crutches. Knee appears soundly ankylosed. Child has made uninterrupted progress since operation, and has greatly improved in physique. There was throughout no record of anything more than a trifling elevation of temperature.

"Buckfastleigh, January 22nd, 1889 (from the father).—In answer to your inquiry as to the condition of Caroline's leg, I beg to say that it looks pretty much as it did when she came home. There are no sores on it, nor does she complain of any pain. She still wears the iron, and we have never allowed her to try to stand on the leg without the iron. Her general health seems pretty good, and she is much stronger in body than she was; appetite good."

Harry K— (Leyton), æt. 7, admitted to Children's Hospital May, 1887, from an orphanage. There was a small sinus below inner tuberosity of right tibia, with much thickening about the head of that bone; knee permanently flexed and increasing in size. The sinus led into an abscess cavity in the epiphysis, which, after being scraped by Mr. Pitts, greatly improved. But in due course the sinus extended into the joint, the boy's temperature rising to 103·4°.

July 27th.—Joint was opened by horse-shoe incision through the patellar ligament. Synovial membrane swollen and injected; an ulcer was found on internal articular facet of tibia, which opened into the cloaca in the inner tuberosity. This was thoroughly scraped; crucial ligaments not removed; joint washed out with mercuric solution, and drained through popliteal space.

Everything went on well; the wounds healed; and the boy walked out of the hospital in a Thomas's splint, February, 1888, with excellent prospect of having a useful though stiff limb.

On January 23rd, 1889, Mr. Priestley saw the boy and reported as follows:

"Harry K—, æt. 7. Came in modified Thomas's splint, wears it day and night. Cannot bear any weight on the

affected (right) leg. The right knee is firmly ankylosed at an angle of about 20° from the straight line; the patella is fixed; the cicatrices are quite healed, but there are still some crusts on them. There is marked tenderness on the inner side of the head of the tibia and inner condyle of the femur, and it causes pain when an attempt is made to straighten the limb. The muscles of the right thigh are considerably wasted. The boy is well nourished, but the circulation in the feet is bad, and he suffers from chilblains."

Lilian M— (Blackmore), æt. 9½, was admitted to Children's Hospital July, 1887, with necrosis of tibia; inflammation and ulceration extended from the upper end of the cloaca into the knee-joint, which thus became involved in suppuration. A large crescentic flap, which included the patella, was turned up; "the synovial membrane was thickened; the joint contained pus; a sinus was seen passing from the joint, down along the inner side of the tibia, and communicating below with the original sequestral cavity." This was thoroughly scraped out, and, together with the interior of the joint, was washed and swabbed with mercuric solution (1 in 2000), a drainage-tube being passed through the popliteal space.

November 3rd.—A sinus leading down by the head of the tibia needed second scraping. At the end of the year the child was walking about well and strong, on crutches, her knee being kept straight in Thomas's splint, the sound foot being raised on a patten.

Maggie L— (Ipswich), æt. 14, came into St. Mary's Hospital August 2nd, 1887. A little more than two years previously she had fallen on to her left knee, which had since been swelled and painful. She had been treated by blistering, Scott's dressing, gypsum splints, and by an "extension apparatus;" she had been in Ipswich Hospital. Knee is "globular," tibia can be moved laterally, and is displaced outwards and backwards.

19th.—The limb having been cleansed, the usual cres-

centic incision was made; pulpy growth concealed crucial ligaments, and semilunar cartilages and surface of tibia. All this mass was cut and scraped away, together with the ligaments and cartilages which were invaded by it, and a drain was passed through Winslow's ligament, and the popliteal space.

30th.—Tube was removed a week ago; last of sutures taken out to-day. Temp. normal.

In the middle of October, though she was much improved in her general health, she had to be put under chloroform again, in order that sinuses at the knee might be laid open and erased, and again on November 13th a sinus on the inner side of the joint had to be similarly dealt with. On this occasion too the whole joint was laid open, much granulation tissue being scraped away, an ulcer on the femur being cleaned out. On another occasion, also, the joint was laid open and thoroughly dealt with, the patella, which showed an extensive soft area, being taken away. After these operations she made uninterrupted progress, and a Thomas's knee-splint having been applied, she went nimbly and happily about, leaving for home towards the end of April, 1888.

Note from the patient, January 26th, 1889:—"I am glad to tell you that my leg is quite free from pain now, but I have still to wear the splint. I have tried to walk on it, but I cannot bear much weight on it yet; it is not at all swollen, and it is quite stiff and quite straight and sound, all the holes are healed up. I can get about the house without my crutches."

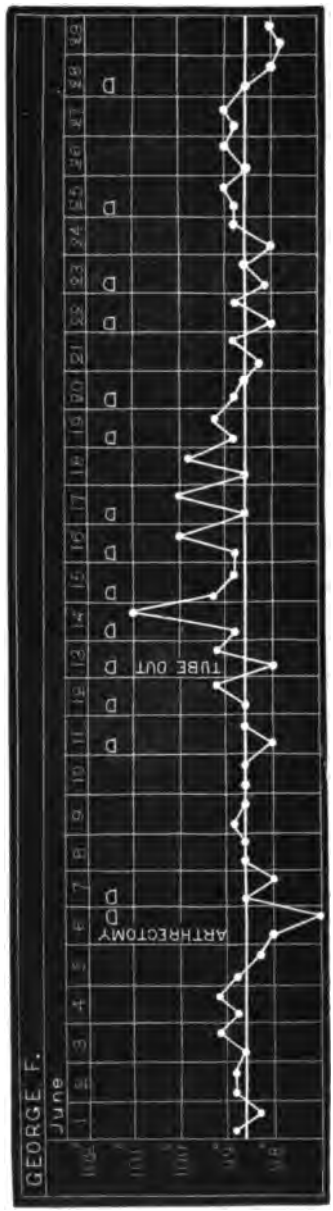
Fred. B—, æt. 8, was admitted to St. Mary's Hospital February 7th, 1888, with a swollen right knee, for which he had been under treatment at another hospital. There was considerable displacement of the tibia, and an abscess was detected deep in the popliteal space, which had evidently made its way from the joint. The deformity of the knee was extreme, and the case altogether did not hold out great prospect for success.

A fortnight later he was operated on, much as is described in the other reports. An abscess was found extending from the interior of the joint along the course of the tendon of the popliteus. There was considerable disease of the femoral condyles. All diseased tissue was removed, and the tendon of the popliteus had to be sacrificed. Considerable tenotomy had to be performed ere the limb could be brought straight.

For two days there was some rise of temperature. After this, however, the chart was marked along the normal line, and the boy was doing well. But towards the middle of April, although he was fairly well in himself, the knee was not progressing, so it was again laid open and scraped out. The appearance presented by the interior of the joint was such as to give promise of ultimate success, but on June 4th the scraping operation had to be gone through for the third time. After this the boy seemed to fail in every way, and in July amputation of the thigh was performed.

George F— (Kentish Town), æt. 7½, admitted to Children's Hospital May 25th, 1888. Eighteen months ago hurt his left knee against kerb-stone; was in-patient at Highgate Infirmary for six or seven months, but for last six months he has been limping about; lost his appetite, and growing thin. Joint much enlarged, and showing marked threefold displacement. Case seemed hopeless for treatment on expectant method.

June 6th.—Joint was opened by free semilunar incision traversing patellar ligament. Knee was found full of granulation tissue and pulpy synovial membrane. All this mass was dissected or scraped away, the semilunar cartilages and crucial ligaments, which were scarcely recognisable in the mass, being also removed. Lateral ligaments had also to be cleared away; end of femur thrust out and scraped clean; before leg could be brought straight, thin slice had to be removed by scalpel from each condyle; tendon of biceps was also divided. Hot zinc-chloride irrigation; drainage through posterior ligament, and through wound



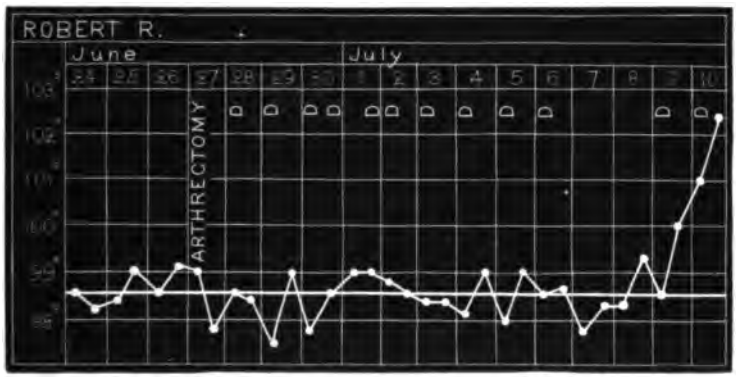
Temperature chart of George F—, p. 77.

made in skin for biceps tenotomy. Mercuric wool dressings. Back splint and outside bracketed splint, with foot-piece.

Ever since the operation the boy has been improving in health and appearance, and when he left the hospital, August 16th, he was going about in a Thomas's knee-splint, with the sound foot raised by a patten.

There was no trenching upon the line of cartilage joining shaft and epiphysis, indeed but a thin layer of the condyles was removed, and it is confidently hoped that though the limb will necessarily be quite stiff, there will be no check to its growth.

Robert R— (Kensal Green), æt. 10, had been in the hospital for five months in 1885 for an abscess in the right knee, which had followed scarlet fever. This was freely opened, irrigated, and drained, and the boy was sent out wearing a Thomas's knee-splint, the foot of the other side being raised on a patten. He wore the apparatus for a



year, after which, his mother says, he was running about without any splint or restraint. For some months before his readmission in May his right knee had been again swelling and growing painful, and he had been failing in health; on his being readmitted into hospital the joint was large and painful, and the tibia was much displaced. In spite

of five weeks' rest upon a splint the knee got steadily worse, an abscess formed in it, and the child was evidently failing in health. On June 27th, therefore, arthrectomy was performed. The interior of the joint was thoroughly scraped out, the tendon of origin of the popliteus was severed, and the neighbouring surface of the condyle was cleaned, but the leg could not be brought into position till the tendons of the biceps, semi-membranosus, semi-tendinosus, and gracilis had been divided. Their section was effected from the surface, the two openings made for this purpose being used for carrying drainage-tubes through the posterior ligament and into the joint.

This boy began to improve directly after the operation; in fact, the removal of diseased tissue from his knee had a remarkably good effect on him generally. The operation was done on June 27th, and his temperature remained normal till July 9th, when it rose to 100°, and next day to 102·4°; then all seemed to go wrong, and the case, which was an extremely important one, and which had for a while given such excellent promise of triumph, ended in disappointment, for amputation had to be performed on August 8th. After this he made a rapid convalescence.

When the unfavorable change set in a desperate attempt was made to save the limb; the wound was opened up and the whole chasm thoroughly scraped over again, and some of the femur and tibia was sawn off. This, however, was of no avail. Why the case went wrong we could not discover.

The next case likewise proved a disappointment, but it differed from that just recorded in that, from the earliest days after the operation, the child gave no promise of a good result.

Ruth N— (Newbury), æt. 9, was admitted to the Children's Hospital April 19th, 1888, for subacute arthritis of the right knee, the result of a fall. The joint was semi-flexed, swollen, and tender, the supra-patellar pouch being distended. The limb was treated by rest on a splint, and

turbid synovia was withdrawn from the joint by aspiration. As there was a steady increase in the size of the knee, and the child's general health was evidently failing, it was deemed advisable to lay open the joint, search for pus, and clean out the pulpy membrane. This was done on May 30th, when, the crucial and lateral ligaments having been cut, and the lower end of the femur thrust out of the wound, an abscess was found running into the popliteal space along the synovial pouch around the popliteal tendon. This was thoroughly evacuated and cleansed with zinc-chloride solution, and a drain was passed through the popliteal space. The child did badly after the operation, and on the supposition that this fact might be likely accounted for by further formation of abscess, she was at the end of a fortnight again operated on, provision being made for further drainage through the back of the joint. No improvement followed, and on June 23rd, after consultation, amputation was resorted to in the lower third of the thigh. The discharge continued profuse; the temperature kept up, and union of the flaps was long delayed. Eventually, however, a marked change for the better took place, the child being allowed out on the balcony as often as the weather permitted.

Careful search through the clinical records of my patients at the Children's and at St. Mary's Hospitals has failed to bring to light more than these reports of arthrectomies. Thus there is no displaying of good results and withholding of bad; good and bad alike are given. In going through the series I must, however, confess to having experienced some little disappointment; I was under the impression that the general result would have been better. Probably this is due to the fact that one's unsuccessful cases are less used for purposes of clinical demonstration in the wards, and are sooner forgotten. Some of us surgeons are apt to carve our good deeds in the rock and to trace our failures in the sand.

I think I may lay claim to all these cases having been, at

the time that I operated on them, fit only for excision or amputation. The successful cases have turned out excellent beyond even our best hopes, but it remains to be seen, after a few years, what is the exact state of the limbs, and especially as to the amount of shortening.

Looking back on these cases, I call to mind how wonderfully well most of the children bore the long and trying operation, and how markedly they were improved by it; how efficient a hot solution of chloride of zinc (ten grains to the ounce) is as an irrigation; and how unsatisfactory is the vertical incision when the whole of the joint has to be dealt with. And insomuch as one cannot be certain that the posterior part of the femoral condyles may not need erasion, the semilunar incision should always be adopted, unless the area of disease be evidently limited to the front of the joint, and such cases may perhaps better be treated by the old, well tried, and approved method of continuous rest.

(For report of the discussion on this paper, see 'Proceedings of the Royal Medical and Chirurgical Society,' Third Series, vol. i, p. 10.)

THE

ÆTIOLOGY OF PUERPERAL FEVER.

BY

WILLIAM ROBERT SMITH, M.D., D.Sc., F.R.S.Ed.,

PROFESSOR OF FORENSIC MEDICINE IN KING'S COLLEGE, LONDON.

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The ætiology of puerperal fever is a subject which has long occupied the attention of observers, and upon which up to the present time no satisfactory conclusion has been arrived at.

By many it has been thought that a close connection exists between erysipelas and puerperal fever,—that erysipelas in short may spread amongst puerperal women as puerperal fever, and on the other hand that puerperal fever may spread in the form of erysipelas; but both Volkmann and Hergenberger regard erysipelas as a separate disease, having nothing to do with the phlegmonous processes of puerperal fever.

Fehleisen[1] has proved beyond doubt the existence of a definite species of micrococcus in the lymphatics of the skin in erysipelas at and beyond the margin of redness. He cultivated this organism on a number of media. On nutrient jelly they were found to grow very slowly as small isolated colonies. Upon inoculating the ears of rabbits extensive redness appeared, which spread towards the root

[1] 'Die Aetiologie d. Erysipelas,' Berlin, 1883.

of the ear, and upon making sections near the margin of redness the micrococci could be detected in the lymphatics. Fehleisen further inoculated seven persons with pure cultivations of the organism; of these six developed typical erysipelas, whilst the seventh was probably protected from a fresh attack, as he had suffered only a short time previously from erysipelas.

More recently the subject has been particularly investigated by Gasserow and Winckel. The former observer reports[1] a number of observations and experiments which lead him to the conclusion that no ætiological connection exists between erysipelas and septic processes in puerperal women. He injected the streptococcus of erysipelas (*a*) into the peritoneal cavities of two rabbits; (*b*) into wounds in the abdominal walls of two others; and (*c*) into the subserous cellular tissue of the peritoneum; in none of these animals did he note any ill effects; nor did he find, upon killing the animals some time after, any pathological changes.

On the other hand Winckel states that from cultivations of the heart's blood of a patient who died thirteen days after parturition from purulent peritonitis and pleuritis, &c., at the same time diphtheritic endometritis and ulceration of the vulva being present, he obtained an organism which he describes as the erysipelas micrococcus of Fehleisen; he also isolated the same organism from the pus present in the peritoneum and pleuræ, and from the spleen, lungs, &c. With these cultivations he inoculated the skin of a rabbit's ear and induced redness; injections into the abdominal cavities of four rabbits produced no result in three cases, in the fourth purulent peritonitis. With white mice his inoculations were always followed by fatal changes evidenced by inflammatory processes in the intestines, enlarged spleen, &c. He fails, however, to say whether the organism was recovered from the heart's blood of these animals.

With a view of further investigating this subject, on the suggestion of Dr Klein, and at the request of the Committee of the Brown Institute, I commenced a series of observations.

[1] 'Arch. f. Gyn.,' xxv, 1887, p. 169.

On the morning of the 18th December, 1886, through the kindness of Dr. Grigg, I was present at the post-mortem examination of a woman who had died the previous evening at the Queen Charlotte's Lying-in Hospital. She was confined on the 9th of December of a live child; on the 11th she had tenderness over the hypogastric region, the abdomen was also distended and tympanitic; on the 12th diarrhœa with offensive stools occurred; on the 14th vomiting; on the 15th, the respirations were hurried, and upon examination of the chest some pleurisy and pneumonia were found at the right base; on the 16th the abdomen was very distended, vomiting incessant, and the face very anxious, and on the 17th she died collapsed.

At the post-mortem examination made nine hours after death the usual morbid appearances were found, indicative of acute peritonitis; large quantities of lymph and turbid serum being present in the peritoneal cavity; a pneumonic condition of the base of the right lung was also present.

To obtain a specimen of blood for purposes of cultivation after the method described by Dr. Klein and used by him always in these cases, I took a capillary glass pipette, and after carefully opening the pericardium I plunged this into the right ventricle of the heart, and in this way obtained a pipette full of blood free from accidental contamination. With this I inoculated a series of eight tubes of nutrient gelatine by passing one end through the cotton-wool plug (previously drawn up half way) into the tube and allowing two or three droplets of the blood to run over the sloping surface of the gelatine, which then by means of the end of the tube were spread more or less uniformly over the surface. I likewise made two gelatine depth cultivations, and two gelatine plate cultivations.

At the same time cover-glass specimens were made of the blood in the usual way.[1] These were stained with gentian violet and examined with a Zeiss' D objective, when micrococci in the form of chains or streptococci were plainly visible.

[1] Weigert and Koch.

On December 20th, that is two days after the inoculation, distinct colonies, varying from eight to ten in number, were visible in each of the surface and plate cultivations, and in the gelatine depth tubes there were also evidences of growth, these colonies being particularly noticeable in one of the surface gelatine tubes, where the four or five droplets of blood had been allowed to run down uninterruptedly from the top of the surface growth to the bottom of the tube.

The following day these colonies were most distinct as small, greyish-white dots, quite isolated, and showing no tendency to become confluent, and in all the tubes these and *no other* colonies showed themselves.

The growths were found to consist of micrococci, and further cultivations were made in gelatine and agar-agar, in broth and in milk.

On the surface cultivation of gelatine the organism grows as a film of numerous non-liquefying, small, greyish-white dots as seen by transmitted light, each distinct, with no tendency to become confluent, being first visible two days after inoculation, and arriving at their maximum growth in the course of ten or twelve days. By reflected light the growths present a whitish or slightly translucent appearance. With the aid of a glass the dots are found to be quite discrete, and although they are all small, some of the colonies appear slightly larger than the others. A number of the older dots show a slight halo surrounding the central dot from which minute points are seen to project. When much older, these dots present a distinctly crenated outline.

The streak cultivation on gelatine shows in from two to three days lines of minute, greyish-white dots by reflected light; the dots are larger in the thickest part of the gelatine, smallest in the thinnest part. By reflected light the growth appears as a distinct streak of whitish and slightly translucent dots, varying somewhat in size.

In the depth of gelatine along the track of the needle numerous closely-packed, minute dots appear, which are

thicker and more opaque in the depth, smaller and more transparent near the surface.

If cultivations be made upon the surface of gelatine slightly tinged by the addition of some aniline dye, *e. g.* Spiller's purple, the organism shows no growth.

In agar-agar made with Brand's essence the organism grows more rapidly, being present as a film of small transparent dots with no tendency to become confluent. As the dots grow older they become surrounded with a halo from which project numerous small dots.

Inoculations into sterilized milk give rise to abundant growth as streptococci. The milk is not curdled.

Broth: In two days after inoculation a slight turbidity occurs, which in a few days passes off, leaving a clear supernatant fluid and a whitish deposit. No pellicle is found, and upon microscopic examination the organism is seen as numerous small chains.

Microscopically the organism is found to be a micrococcus, having a great tendency to form diplococci. Specimens examined from broth or milk show numerous short chains or streptococci.

On December 28th I inoculated two white mice from an agar-agar cultivation and also two guinea-pigs.

On December 31st one of the mice inoculated was found dead. There was congestion at the bases of the lung and of both kidneys; the spleen was also enlarged and congested. I made four gelatine tube cultivations of the heart's blood.

January 1st, 1887.—The second mouse was found dead. The same post-mortem appearances presented themselves. Gelatine tube cultivations were made with the heart's blood.

The guinea-pigs showed slight swelling at the site of inoculation, but otherwise appeared well.

January 3rd.—The tube cultivations of the heart's blood of both mice show characteristic dotted growth.

By repeated cultivations of this growth in the various media, I thoroughly satisfied myself I was dealing with the organism originally obtained from the puerperal patient.

With cultivations of the organism, both of the original and of that obtained from the mouse, I inoculated the ears of four rabbits, and in all cases such inoculations were followed in the course of twenty-four hours by a diffused redness which passed off in the course of two or three days and did not show any disposition to spread to the root of the ear, in this respect differing most markedly from the streptococcus of Fehleisen,[1] as well as from the *Streptococcus pyogenes* described by Rosenbach, although these species are in cultural characters similar, and belong to the same group as a number of other species, *e.g.* the *Micrococcus scarlatinæ* of Klein.

I made further inoculation experiments upon white and grey mice, both with cultivations of the micrococci obtained from the heart's blood of the mice and in all cases such inoculations were followed by the death of the animal in two or three days, and general congestion of the organs with enlargement of the spleen was detected on post-mortem examination. Again, in this a marked difference is to be noted in the action of this organism and that of the *Streptococcus pyogenes*.

On 29th March, 1887, through the kindness of Dr. Matthews Duncan, I was allowed to take some blood from the finger of a patient at St. Bartholomew's Hospital, who had been confined on the 22nd inst. The notes of the case supplied to me were as follows :

23rd.—Patient very hot and feverish, had two or three rigors.

24th and 25th.—Had further rigors, much headache, nausea, and vomiting.

26th.—Admitted into hospital, when the following note was taken : Patient very anxious, complains of pain over the abdomen, lochia not fœtid. Pulse 120, soft ; temp. 101° : had a rigor this morning, when temperature reached 105·4°. Urine albuminous. Complains of pain in the left shoulder and elbow and both knees, which are swollen and tender.

[1] Desbribed most ably by him, 'Aetiologie d. Frysipelas,' 1883.

29th.—Rigors continue. Temp. 106°, pulse 120. Pain and swelling in both shoulder-joints.

31st.—The patient died, but no post-mortem examination was allowed.

I took the specimen of blood in the usual manner, and with the proper precautions. The tip of the finger was first well washed with carbolic-acid solution, and a small piece of tape was then wound round the centre of the finger to cause slight congestion of the tip. With a needle then finger was the pricked and the blood drawn into a capillary glass pipette; with this four gelatine tubes were inoculated.

During my absence from the laboratory for a few days, Dr. Klein had been good enough to attend to these tubes, and on the 31st he discovered evidence of growth in all the tubes, as small, whitish dots. These increased somewhat in size and after a time became crenated. One of such colonies, which appeared larger than the others, was spread out over the surface by means of a platinum wire, and then grew as a film of small, translucent, non-liquefying dots. In no single instance did any other organism present itself.

In all respects this growth resembled that obtained from the other patient. Cultivations were made on gelatine and agar-agar and in broth and milk with like results. Mice were also inoculated with the organism: they died in the same time as those inoculated with the organism obtained from the blood of the first patient and they presented post mortem the same appearances, the organism being in like manner recovered from the heart's blood. The ears of rabbits were inoculated both with the organism cultivation from the patient and from the mouse with similar results, viz. a diffused redness passing off in the course of two or three days.

Portions of the organs of the patient who died at Queen Charlotte's Hospital and of the various mice were preserved in Müller's fluid, and sections were made and stained in methyl blue, gentian violet, and eosin, but I have failed

to detect the organism except in the lung of the patient, which showed a few scattered micrococci.

From the foregoing facts I am led to the following conclusions:

1. That this organism occurs in the blood of patients affected with puerperal septicæmia in considerable numbers in the form of streptococci.

2. That in its cultural characters in various media differences can be observed by which it can be distinguished from other streptococci.

3. That it is a distinct and definite species as proved by its action upon rabbits and mice, although it belongs to the same group as other pathogenic streptococci.

4. That it is not the streptococcus of erysipelas of Fehleisen, its action on the ear of the rabbit being quite different; the latter producing, in the majority of instances, typical erysipelas.

5. That it is not the *Streptococcus pyogenes* of Rosenbach, not only because of its cultural peculiarities—one of these being the abundant growth of the *Streptococcus pyogenes* upon gelatine tinged with Spiller's purple,—but because of its certain action upon mice and upon rabbits. *S. pyogenes* has no effect upon mice to the extent of some 80 per cent. of cases, and likewise rarely produces any effect upon the ear of the rabbit, and when it does, it is a transitory congestion followed by the formation of an abscess.

(For report of the discussion on this paper, see 'Proceedings of the Royal Medical and Chirurgical Society,' Third Series, vol. i, p. 22.)

ACETONURIA AND ITS RELATION TO DIABETIC COMA.

BY

SAMUEL WEST, M.D.

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THE discovery by Gerhardt of a body in diabetic urine, giving a peculiar reaction with perchloride of iron, which was at first regarded as ethyl diacetate but later as diacetic acid, and the detection of acetone subsequently by Petters in the urine, blood, and breath of diabetic patients, when taken together with the ease with which acetone may be derived from diacetic acid or ethyl diacetate, led to the ready adoption of the belief that the symptoms of diabetic coma were due to poisoning by acetone, and the name acetonæmia passed almost at once into common use. But more than a grave doubt now exists whether both these bodies are not rather the accidental concomitants than the essential causes of the comatose condition.

The relation of acetonæmia and acetonuria to diabetic coma has been investigated on the one hand by experimental intoxication with acetone, and on the other by clinical observations. This paper is a contribution to the clinical side of the problem. I desire to acknowledge the valuable assistance I received from Dr. Mary Goodman at the Royal Free Hospital, without whose co-operation so

extended a series of observations would not have been carried out.

The results of experiment go very far to disprove the theory, and though, as would be expected in so difficult an inquiry, the conclusions of different observers do not agree in all particulars, still the balance of evidence inclines strongly against it.

Petters and Rufstein, by the injection of acetone, produced in dogs symptoms which they regarded as similar to those of diabetic coma, but Fleischer, Kussmaul, Reinecke, and others showed that to produce these symptoms more acetone was required in the blood than had ever been found in diabetes, and they were also of opinion that the symptoms obtained differed materially from those of diabetic coma.

Frerichs and Le Nobel failed entirely to produce the toxic effects required with acetone, diacetic ether, or diacetic acid.

Albertoni[1] conducted a most elaborate series of experiments, and found that in dogs it was necessary to administer eight grammes per kilogramme of body weight to produce a fatal result, while four grammes per kilogramme produced only a kind of drunkenness and a delirium similar to that resulting from alcoholic intoxication. Such quantities as these are far in excess of the amounts possible in diabetes. He therefore concludes against acetone as the cause of diabetic coma.

Acetone has been administered also to man, in full doses, as a remedy in phthisis, without any unpleasant symptoms. Frerichs[2] gave to a man ten to twenty grammes daily, and larger amounts to dogs, without producing any symptoms at all, and Albertoni gave fifteen to twenty grammes with no other symptom than a little drowsiness.

Against these results the objection has been urged that though acetone may fail to produce the required symptoms

[1] 'Jahresb. d. Ges. Med.,' 1884, p. 243; 'Arch. f. Exper. Path. u. Pharm.,' xviii, 218.

[2] 'Zeitsch. f. klin. Medic.,' vi, 1.

in *healthy, i. e. non*-diabetic men, it does not necessarily follow that it would fail in diabetics. The experiment has, however, been made, I believe, upon diabetics, and without untoward results.

Frerichs further found that acetone administered to rabbits and dogs was found in the urine, so that it was not destroyed or rendered inert, and as the result of his experimental observations he also concludes against the theory that acetone can be the cause of diabetic coma.

Le Nobel performed similar experiments, though not on so extensive a scale, and arrived at a similar conclusion.

It has also been shown by v. Jaksch[1] that acetone cannot be derived from sugar by alcoholic fermentation, though it may be by lactic acid fermentation. This form of fermentation, it was thought, might take place in the intestines by the action of some special ferment, but experiment with the contents of the intestines in diabetic patients upon the fermentation of sugar showed that *alcohol* was produced, but no acetone.

The different lines of experiment lead to the same conclusion, and are directly opposed to the theory that acetone is the cause of diabetic coma.

The investigation of the question from the clinical side was for a long time rendered difficult by the want of delicate and at the same time reliable tests suitable for bedside use. The most valuable work on this subject has been performed by v. Jaksch,[2] who in a recent paper has investigated the various reactions and recorded his own clinical observations. It is upon this paper that my own observations have been based.

The tests which he gives are six. They follow in order of delicacy.

1. *Lieben's iodoform test.*—To some cubic centimetres of the destillate of the urine are added a few drops of strong caustic soda and several drops of a solution of

[1] Loc. cit.

[2] v. Jaksch, 'Ueber Acetonurie u. Diaceturie,' Berlin, 1885.

iodine in iodide of potassium. If acetone be present a precipitate falls, either in the crystalline or the amorphous form. The iodoform can be recognised on drying by the odour and by Vitali's test, *i. e.* a violet colour with a little solid caustic soda and a drop of thymol, the colour on the addition of an acid passing into scarlet.

This is an extremely delicate test, and will detect easily 0·01 milligramme of acetone, or even much less than this, it is stated as little as 0·0001 milligramme.

The objection to it is that other substances also give the reaction, such as alcohol and aldehyde, but of these alcohol alone is likely to be found in the urine. With alcohol, however, the test is not nearly so delicate, and the amount of alcohol in the urine is stated to be small.

2. *Gunning's iodoform test.*—This test consists in the use of ammonia instead of soda or potash and of an alcoholic tincture of iodine instead of the solution of iodine in iodide of potassium.

2 *a.* Le Nobel further modified this by using iodine dissolved in iodide of ammonium. A dark precipitate is obtained of iodide of nitrogen, which when acetone is present is slowly decomposed to form iodoform, the time required depending upon the amount of acetone present.

The disadvantage of the test lies in the black precipitate which forms, but the advantage is that alcohol does not give the reaction, nor, it is stated, does aldehyde. Its delicacy is, however, much less than that of Lieben's test.

3. *Reynolds's test.*—This depends upon the property which acetone has of dissolving freshly precipitated oxide of mercury.

To a strong solution of mercuric chloride is added some of the solution to be tested, and then an excess of caustic soda solution.[1] The yellow mercuric hydrate first precipitated by the alkali redissolves, and an alkaline liquid is obtained which is rich in mercury. If the filtrate be now

[1] v. Jaksch uses an alcoholic solution of caustic soda, as mercuric hydrate is slightly soluble in water, but not at all in alcohol.

rendered acid, mercury can be demonstrated in it by means of sulphide of ammonium.

This reaction will detect 0·01 milligramme of acetone, but acet-aldehyde, v. Jaksch states, will also dissolve mercuric oxide.

If to the acetone-mercuric solution previously obtained some acetic acid be added, until the liquid be faintly acid, a white precipitate is obtained which coagulates on heating like a solution of albumin or white of egg $= (CH_3COCH_3)\ 3HgO$.[1]

If aldehyde be present instead of acetone, the precipitate of mercuric oxide does not redissolve, but on heating it gradually becomes greyish white.

4. *Legal's test.*—If to the urine containing acetone a solution of nitro-prusside of potassium and a little caustic soda be added, a ruby-red colour is obtained, which on the addition of a few drops of acetic acid passes into dark purple. This will detect about 0·5 milligramme of acetone.

5. *Le Nobel's test.*—The same as the preceding, except that ammonia or carbonate of ammonia is used instead of caustic potash. This also gives a violet red colour, which develops more quickly if a little acetic acid be added, provided that the solution still remains alkaline. After about ten minutes the colour fades to yellow. The yellow colour without the previous violet may develop without the presence of acetone.

6. *Penzold's test.*—If to a solution containing acetone some solution of ortho-nitro-benz-aldehyde be added, with some caustic soda, till the reaction be alkaline, the colour becomes at first yellow, and then green, and in about ten minutes indigo blue separates.

This is the least delicate test of them all, for by it only 1·6 milligrammes of acetone can be detected.

As the nitro-prusside test gave such a well-marked colour, I thought some characteristic spectrum might be obtained, but I failed entirely either with acetone solution or

[1] Reynolds's 'Experimental Chemistry—Organic,' p. 106.

with urine containing acetone, with and without the addition of acetic acid.

The two tests which seemed most convenient were the nitro-prusside test in the urine direct, and the iodoform test in the destillate. Although it is stated that the iodoform test may be applied to the urine direct, I have only twice succeeded in obtaining the reaction, and then imperfectly.

The iodoform test is readily given by alcohol and by aldehyde. Alcohol may occur in the urine, but only, it is said, in small amount, and the reaction is much less delicate.

It appeared to me that if in the urine direct the nitro-prusside test was given, and in the destillate the nitro-prusside test and also the iodoform reaction, the conclusion might be safely drawn that acetone was present. It is upon these two tests that I have relied in the following observations.

I did not at the time fully appreciate the delicacy of Reynolds's reaction, or I should have also used this test to confirm the results obtained by the other methods.

Though the special object of my inquiry was to ascertain the relation which existed, if any, between acetonuria and diabetic coma, I at the same time applied the perchloride of iron test, which had also, it was formerly supposed, some relation to the same condition.

Before applying the tests in diabetes, I examined with the same tests the urine of thirty non-diabetic patients taken at random, convalescent from various diseases. In none of them was any iron reaction obtained. With the nitro-prusside test out of the same thirty cases, ten gave no colour reaction at all, fifteen gave a colour but not that characteristic of acetone; it was unaffected by acetic acid in nine, and discharged by it in six. Out of these thirty, three gave an imperfect nitro-prusside reaction; one was a case of cirrhosis of the liver, one a case of chronic rheumatism with slight albuminuria, and the third a case of Jacksonian epilepsy; in this last case the reaction was obtained only on one occasion.

The urine of the cirrhosis case was distilled. In the destillate neither the nitro-prusside nor the iodoform test was successful, but the nitro-prusside reaction was given by the residue in the retort. I have observed the same thing in a few other cases, so that there must be some non-volatile substance capable of giving the reaction, but it is not often met with.

In another series of similar cases taken at random from the wards of St. Bartholomew's Hospital, the iron reaction was absent in all, as was also the true nitro-prusside colour. In twenty-five a reddish-brown colour was obtained with nitro-prusside, but it either became lighter on the addition of acetic acid or faded altogether.

It was clear that acetone was not often found in the urine of healthy persons. Still further investigations showed that acetonuria was not infrequent among non-diabetic patients, while suffering from actual disease.

In non-diabetic patients the reactions indicating the presence of acetone were obtained in the following cases:

	Reaction with perchloride of iron.
In four cases of pneumonia, 12, 12 *b*, 14, 15	Present in all four.
In two cases of typhoid fever, 16, 17	None.
In one case of gastric ulcer, 24	„
„ cirrhosis hepatis, 25	Present.
„ spinal affection in a child, 28	„
„ cerebral hæmorrhage from injury, the patient dying comatose, 11	„
„ delirium tremens, 26	„
And in four cases of rheumatic fever	None.

Besides these there were reactions which indicated the possible presence of acetone, but which did not seem to me quite conclusive; in a case of bronchitis (22), in a case of cancer of the liver (26), in a case of pyæmia (27), and in a case of abdominal section (32). In all of these cases except the first, that of bronchitis, the iron reaction was also present.

These cases were all taken more or less at random, and they are sufficient to show that acetonuria is a fairly

common phenomenon of disease in non-diabetic patients, and as only one of them was in a comatose state, it is clear that acetonuria is not necessarily associated with coma. Moreover, it is clear that, in many of them, the acetonuria depended upon the illness for which the patients were under treatment, for on recovery the acetone reactions were no longer obtained (14, 16, 25, 26); but in many of the cases referred to this point was not specially investigated, the observations terminating when the existence of acetonuria had been established.

Another point of interest is the variation in the intensity of the reactions on different days (12 *b*, 19), variations which stood in no evident relation to any change recognised in the condition of the patient. The iron reaction, though not always present with acetonuria, was still sufficiently often associated with it (eight out of sixteen) to suggest some other than a merely accidental connection between them.

These observations confirm the statements made by other writers. V. Jaksch, who has especially investigated this question, has shown that acetonuria is common in all diseases accompanied with high continuous fever, and he names this febrile acetonuria; and further, that it is also frequent in some forms of cancer, in inanition, and in some of the psychoses. Acetonuria therefore is not peculiar to diabetics, and is not necessarily associated with coma.

Diabetic Cases.

Fourteen cases of diabetes were examined, and two cases of temporary glycosuria, the one in a case of alcoholism, and the other in a case of cirrhosis of the liver. Of these four died comatose (5, 6, 13, 14), and one died of septicæmia; in two of the coma cases (5 and 6) both the iron and the nitro-prusside reactions were well marked in the urine direct, and the nitro-prusside and the iodoform reaction in the destillate. In the third (14) these reactions

were all absent, and in the fourth (13), in which only one determination could be made, neither the iron nor the nitro-prusside reactions were obtained in the urine direct.

In the septicæmic case, the patient dying of asthenia and not of coma, all the reactions were well marked.

In the remaining nine cases the acetone reactions were well marked in six, and absent in the three others; but in two of these only one determination could be made.

Thus acetonuria may be absent in diabetic *coma* and present in diabetics who are *not* comatose.

These general statements, made as the result of comparing these cases broadly with one another, are amply confirmed by daily observation of individual cases. Take, for example, Case 1 (diabetes, doing well). The reactions were at first fair, and gradually increased until they became unusually well marked, the patient being, so far as could be seen, in her usual health. They then became less and less, and after being faint for a day or two again returned to their previous intensity.

The urine in this case was examined on thirty different days almost consecutively. The patient left the hospital much improved in health, and since leaving has been frequently seen, and the urine has presented the same reactions.

In Case 7 similar variations occur. The patient improved greatly under treatment, and towards the end of the time in the hospital the reactions diminished in intensity.

In Case 8 the variations were very well marked. The patient died, but not comatose, and as she grew worse the reactions diminished in intensity.

In Case 13 a woman whom I only saw once as she was dying with panting dyspnœa but not comatose, the urine contained, if any, only the merest trace of acetone, though the room in which she lay, and indeed the whole house, reeked with the odour usually ascribed to acetone.

Case 14 again was under observation for some time, and died comatose, but never had acetonuria at any time.

The facts which the foregoing observations establish are these:

1. Acetonuria is common in diabetics without coma.
2. It is not constantly present in cases of diabetic coma.
3. It varies greatly in the same case from time to time without any evident cause.
4. It stands in no relation to the amount of sugar, but varies independently of variations in the sugar, specific gravity, &c.
5. It may even disappear when coma develops.

The conclusion to be drawn is clear, viz. *that acetonuria does not stand in any definite relation to diabetic coma.*

The Iron Reaction (? Diaceturia).

If the iron reaction and the acetone reaction be compared in the Tables given it will be seen:

1. That the iron reaction is rare except in cases of diabetes.
2. That it may be present when acetone is absent.
3. That it may be absent when acetone is present.
4. That they may be both present or both absent at the same time.
5. That one may be well marked when the other is ill developed.
6. That neither stands in any definite relation to coma.

While the facts just stated make it clear that there can be no necessary or essential relation between the two substances, still they are often enough associated to suggest some indirect connection between them.

Although it is clear that acetonuria is not associated constantly with diabetic coma, still, it might be objected, it is not a safe conclusion to draw that therefore acetone may not be the cause of the coma, for alcohol produces very serious and marked symptoms, and yet but little appears as such in the urine. This objection is answered by the results of experimental intoxication with acetone,

for, as already stated, the symptoms produced are not those of diabetic coma, and also by the fact that acetone administered by the mouth is eliminated as such, *i. e.* unaltered in the urine.

Is then the presence of acetone in the urine of no clinical importance? I do not think so; on the contrary, it seems to me that the presence of *acetone*, and still more of the iron reaction, is a hint that the patient is in a worse condition than when either or both are absent. It may be that the symptoms of poisoning depend upon some defective chemistry in the body, by which a poisonous substance of a nature at present unknown is produced, and that one or other or perhaps both of these substances may be developed as by-products, so that their presence in the urine may be useful as giving a hint of danger, though not as indicating the actual poisonous bodies upon which the symptoms depend. This seems to be especially the case with the iron reaction. Its appearance can be brought about almost at will in any diabetic patient by excitement, worry or fatigue, and how important these conditions are in determining the occurrence of coma is well recognised.

The observations here recorded were made some months ago, but I hesitated to publish them, feeling that the ground had already been covered so much more completely by v. Jaksch and others working in Germany. I hope, however, they may have their use, as they support by clinical observation the more elaborate results obtained in the laboratory, and as they confirm the conclusions at which v. Jaksch had already arrived, that acetonæmia or acetonuria is a misleading and erroneous term, if used as synonymous with diabetic coma.

CASE 1.—Diabetes, doing well.

Date.	Quantity of urine in ounces.	Sp. gr.	In urine direct.		In destillate.		
			Iron reaction.	N. P.	N. P.	Iodoform reaction.	
Nov.							
11	...	...	Good	Good			
12	156	1040	„	„	Good	Good	
13	177	1040	„	„	„	„	
15	226	1036	„	„	„	„	
16	241	1038	„	„	„	„	
17	224	1040	„	„	„	„	A slight trace of albumen.
18	196	1040	Fainter	Fainter	„	„	No albumen.
19	196	1040	Strong	Strong	„	„	
20	184	1040	„	„	Very pronounced		
22	180	1042	Fainter	Fainter	Poor	Poor	No residue when all
23	180	1046	Good	Good	Good	Good	acetone had been
24	...	1024	„	„	„	„	distilled over. No
25	...	1040	„	„	„	„	reaction was ob-
26	...	...	„	„	„	„	tained with FeCl,
27	...	...	Stronger	Stronger	Stronger	Stronger	but with N.P., and
28	...	...	Good	Good	Good	Good	excess of strong
29	...	...	„	„	„	„	KHO, a dirty vio-
30	...	...	„	„	„	„	let was obtained.
Dec.							
1	...	...	Strong	Very strong	Very strong	Very good	
2	...	...	Good	Good	Good	„	
3	...	...	„	Very good	Very good	„	
4	...	...	Fair	Good	Good	Good	
6	...	...	Very good	„	„	„	
7	...	...	Good	„	„	„	Iodoform obtained in urine direct.
8	...	...	Fair	„	„	„	
9	...	...	Good	„	„	„	
10	...	...	Fair	Fair	Fair	Fair	
11	...	...	„	„	„	„	
13	...	...	„	„	„	„	
14	...	...	Poor	„	Good	Good	
15	...	...	„	„	„	„	Patient left hos-
23	...	1050	Good	Very good	Very good	Very good	pital, but was seen on three occasions subsequently.
Jan.							
13	...	1052	Fair	„	„	„	
Mar.							
18	...	...	Poor	Fair	„	„	

CASE 2.—Diabetes, with cataract, doing well.

Date.	Quantity of urine in ounces.	Sp. gr.	In urine direct.		In destillate.		
			Iron reaction.	N. P.	N. P.	Iodoform reaction.	
Jan.							
20	...	...	Fair	Fair	Good	Good	
21	...	...	,,	Poor	Fair	Fair	
22	...	...	,,	,,			
23	...	...	Very good	,,	Very poor	Very poor	
24	...	...	Slight	Very poor	Poor	Fair	
25	...	...	Fair	,,	Very poor	Very poor	Urine alkaline.

CASE 3.—Diabetes, doing well.

Date.	In urine direct.		In destillate.		
	Iron reaction.	N. P.	N. P.	Iodoform reaction.	
Feb.					
8	0	Poor	0	0	The quantity of water varied from 40–70 oz.
11	0	Fair	Poor	Poor	
12	0	,,	Fair	Fair	Sugar varied from 12–17 grains per oz.
15	?	,,	?	0	
16	0	,,	?	0	Patient had had diabetes once before, and said she was "cured."
17	0	,,	0	0	
18	0	,,	Not distilled		
23	0	0	,,		On her discharge there was only a faint trace of sugar.
24	0	0	,,		
25	0	0	,,		
28	?	Fair	,,		Her chief complaint was pruritus.

CASE 4.—Patient suffering from Cirrhosis of Liver with temporary glycosuria.

Feb.					
8	0	Good	?	0	
10	...	,,	Poor	0	
11	...	Poor	0	0	
15	...	Good			
22	...	Fair	?	Fair	
23	...	Poor	?	?	
Mar.					
1	...	Very poor	Very poor	Very poor	
3	...	...	...	...	Left hospital with urine free from sugar.

CASE 5.—Diabetes, doing well for some time, but dying comatose.

Date.	In urine direct.		In destillate.		
	Iron reaction.	N. P.	N. P.	Iodoform reaction.	
Feb.					
11	Very good	Very good	...	Very good	
12	Fair	Good	...	Good	
14	,,	Very good	...	Very good	
15	Good	Very strong	...	,,	
16	,,	Good	...	,,	
17	,,	Very good	...	,,	
18	Very good	,,	...	,,	
21	Fair	Good	...	Good	
22	Poor	,,	...	Poor	
23	Better	Poor	...	,,	
24	Fair	Very good	...	Good	
25	Good	Good	...	,,	
28	,,	Very good	....	Very good	
Mar.					
1	Very good	Good	...	,,	
2	,,	Very good	...	,,	
3	Good	,,	...	,,	
4	Fair	Poor	...	,,	
5	,,	,,			
7	,,	Good	...	Good	
8	,,	Very good	...	...	Fits of drowsiness came on, and the patient eventually died comatose.
10	,,	Poor	Poor	Very good	
11	,,	Very poor			
14	,,	Good			
15	Good	Very good			
16	,,	Good	Fair	Very good	
18	Poor	Very good			
20	Good	Good			
28	Fair	Fair			
29	,,	,,	Very good	Good	

CASE 6.—Diabetic coma; death.

May					
10	Very good	Very good	Very good	Good	
11	,,	,,	,,	Very good	

CASE 7.—Diabetic coma; child admitted moribund.

	0				

CASE 8.—Diabetes, gained flesh.

Date.	In urine direct.		In destillate.		
	Iron reaction.	N. P.	N. P.	Iodoform reaction.	
May					
11	Very poor	Fair	Good	Very good	
12	„	Good	„	„	
13	„	„	„	„	
14	Poor	„	„	„	
15	„	Fair	„	„	
16	„	Good	Very good	Very good	
17	„	Fair	Poor	Slight	
18	„	Very poor	?	?	
20	„	Good	Very poor	Poor	Not distilled.
21	„	„			
22	Very poor	Fair			
23	Very good	Good			
24	0	Poor			
25	0	Very poor			
26	0	„			
27	Very poor	„			
28	Poor	Poor			
29	„	Very poor			
30	„	„			
June					
1	„	„			
3	„	Poor			
5	Very poor	Very poor			
7	0	0			
Feb. 29, 1888	0	0	...	...	Sp. 1040, much sugar, but patient in good health.

CASE 9.—Septicæmia in coma of Diabetes; death.

May				
7	0	0	0	0
9	Very poor	?	0	0
10	Poor	Very poor	0	0
16	0	Fair		
18	0	Poor		
20	Poor	Good	Poor	Poor
21	Fair	„		
25	Good	Very good		
26	Fair	Good		
27	Poor	Very good	Very good	Good
28	Fair	Good		
29	„	„		
31	Poor	Poor		
June				
2	„	„		
5	„	„		
7	Very poor	Very poor		

CASE 17.—Typhoid.

Date.	In urine direct.		In destillate.		
	Iron reaction.	N. P.	N. P.	Iodoform reaction.	
Apr. 25	Poor	Good	Very good	Very good	Temp. 101°.

CASE 18.—Acute Rheumatism.

Mar. 2	Good	Very good	Poor	Poor	Temp. 101°.
3	Sod. Salicyl.	Good	Good	„	
8	Poor	Fair	Fair	0	Temp. normal.

CASE 19.—Acute Rheumatism.

Mar. 4	Poor	Good	Fair	Poor	Temp. 102°.
5	Sod. salicyl.	Fair	Good	Good	
7	„	„	Fair	Fair	
8	„	„	Very poor	0	
10	Good	Very good	Poor	Poor	
11	0	Good	...	...	Temp. normal.
14	0	Fair			
25	Good	Good			
Apr. 24	0	?			

CASE 20.—Acute Rheumatism.

Mar. 18	Sod. salicyl.	Very good	Poor	Slight	Temp. 103°.
22	„	Good			
25	„	Very good	...	...	Temp. 101°.

CASE 21.—Acute Rheumatism.

Mar. 17	Sod. salicyl.	Good	Good	Very good	Temp. 101°.
18	„	Very good	„	„	
19	„	„	0	0	
22	„	„			
26	„	Good	0	0	

CASE 22.—Bronchitis.

Apr. 25	Poor	Good	?	Fair	Temp. 100°.

CASE 23.—Carcinoma of Liver.

Mar. 29	Fair	Good	?	Good	Temp. 99°.

CASE 24.—Gastric Ulcer.

Date.	In urine direct.		In destillate.		
	Iron reaction.	N. P.	N. P.	Iodoform reaction.	
Jan.					
24	?	Good	Fair	Fair	
25	0	Poor	0	0	
Feb.					
7	0	0			

CASE 25.—Cirrhosis of the Liver; Paracentesis.

Feb.					
10	Slight	Good	Fair	Slight	Temp. 98·4°.
11	Very good	Very good	Very good	Very good	
12	Good	,,	Fair	Poor	
14	Very poor	Good	Poor	,,	
15	,,	Fair	?	0	
Mar.					
3	Slight	,,	0	0	

CASE 26.—Alcoholism, with temporary glycosuria.

May					
14	Very good	Very good	Very good	Very good	Sugar 4 %.
16	Good	Good	Fair	Fair	
17	Fair	Fair	Poor	Poor	
18	,,	Poor	0	0	
20	,,	Fair	0	...	No sugar on leaving.
21	,,	Very poor	0		
23	Poor	?	Poor		

CASE 27.

Apr.					
27	Fair	Fair	Poor	Poor	
Mar.					
5	Poor	,,	,,	,,	

CASE 28.—Spinal affection in a child.

Mar.					
10	Good	Very good			
11	,,	,,	Good	Fair	
14	Fair	?			
28	,,	Poor	0	,,	

CASE 29.—Diabetes, improving. F., 65.

Oct.					
11	Poor	Poor			
25	0	0			

CASE 30.—Diabetes, improving. F., 49.

Date.	In urine direct.		In destillate.		
	Iron reaction.	N. P.	N. P.	Iodoform reaction.	
Oct.					
13	0	0			
27	0	0			

CASE 31.—Diabetes. F., 58.

Oct.					
17	0	0			

CASE 32.—Abdominal Section for Tumour; death.

For several days after operation there was a strong iron and N. P. reaction; but before the operation none.

CASE 33.—Diabetes; patient dying with Dyspnœa, but not comatose.

—	Very good	Poor	0		

CASE 34.—Diabetes, severe case; dying comatose.

Dec.	Good	0	...	...	Urine examined many times, but no acetone found.
Mar. 3	„	0	...	...	Comatose; still no acetone.

CASE 35.—Diabetes; not comatose.

May					
10	Strong	Good	Good	Good	
11	0	Fair	„	Very good	

(For report of the discussion on this paper, see 'Proceedings of the Royal Medical and Chirurgical Society,' Third Series, vol. i, p. 28.)

ON PRIMARY UNION

AFTER

EXCISION OF TUBERCULAR HIP-JOINTS.

BY

BILTON POLLARD, B.S., F.R.C.S.

Received November 7th—Read December 11th, 1888.

THE object of this short paper is to draw attention to the fact that the wounds necessary for the extirpation of tubercle from joints will heal as rapidly and as permanently as other wounds of a similar size, if certain essential conditions be secured:

1. The whole of the tubercular growth must be removed.
2. Perfect asepsis must be assured.
3. Bleeding must be checked and the wound made as dry as possible.
4. Oozing must be restrained by the even elastic support of a wool dressing and a moderately tight bandage.
5. Absolute rest of the part must be maintained during the process of healing.

The last four of these essential conditions may be secured in all cases, but the first, viz. the complete extirpation of the tubercular growth, cannot be guaranteed in

any. It is, however, possible that the disease may be arrested even if a little of the tubercle be left.

The hip-joint has been selected for illustration of the views and methods of treatment advanced in this paper, because I believe that of all excised joints the hip has been found the slowest to heal.

In June, 1888, Mr. Barker, in his Hunterian Lectures at the Royal College of Surgeons, expressed his belief that drainage-tubes might, in suitable cases, be dispensed with and healing by first intention might be secured after excision of the hip on these principles. The soundness of this opinion Mr. Barker soon demonstrated. Up to that time I never ventured to treat an excision of the hip without a tube, as I doubted the capacity of the wound to dispose of the serous discharge. Since Mr. Barker's operation four cases of advanced hip disease with caseous abscesses have come under my care. In three of them the abscess was in front of the joint, and in the fourth it was behind it. Three were operated upon by the anterior incision, and the fourth by a curved incision round the upper and posterior border of the trochanter. Drainage-tubes were not employed in any of the cases. The serous discharge either escaped between the stitches or was reabsorbed by the wound, with but slight fever, and that of short duration. The dressings were changed on the seventh day after the operations and the wounds were found to have healed by first intention throughout.

The following case is one of the three operated upon by anterior incision.

T. S—, a boy, æt. 8 years, was admitted to the North Eastern Hospital for Children on May 29th, 1888. Two months later doubtful deep fluctuation was detected at the upper and outer part of the thigh. A month later the fluctuation was very distinct. On September 1st the abscess was opened by the anterior incision, and after it had been scraped out, it was plugged with sponges. The track from the abscess into the joint was enlarged sufficiently to allow of the extraction of the head of the femur

after the neck of the bone had been divided with Adams's saw. There was a pouch behind the trochanter beneath the glutei muscles. This and the cavity of the joint, including the acetabulum, which was denuded of cartilage, were scraped and repeatedly scrubbed with sponges until not a trace of tubercular débris could be removed. The cavity of the joint was then tightly plugged with sponges mounted on clamp forceps and the sutures were placed in position. After removing the sponges the wound was syringed out with an emulsion of iodoform, and the cavity of the joint was left full of the emulsion until the sutures were tied. A pair of sinus forceps was then passed down to the acetabulum, between two of the upper sutures, so as to make a track, along which as much as possible of the fluid might be expressed by abducting the limb and pressing over the front and back of the joint. A dressing of boracic-acid powder thickly laid on, and covered by salalembroth gauze and wool was quickly applied and fixed on by a rather tight spica bandage. A double Thomas's splint was finally adjusted.

The highest temperatures were 101·2° on the fourth day, 99° on the fifth, and 100·2° on the sixth and seventh; the temperature was afterwards below 100°. Some serum soaked through the dressing a few hours after the operation. The soiled spot was mopped over with 1 in 500 solution of perchloride of mercury, and some more wool was put on over it. The dressing was changed for the first time on the seventh day after the operation. It was quite dry. The wound had healed by first intention. Three stout sutures of relaxation were removed. On the tenth day the fine adjusting sutures were taken out and a small piece of wool fixed on with collodion formed the subsequent dressing. Before the operation the boy complained greatly of pain and screamed repeatedly in his sleep; after it he was free from pain and slept quietly. He was discharged on September 29th (the twenty-eighth day after the operation). The hip has since remained sound.

In another case the operation and subsequent progress

were almost identical with that just narrated. In the first case which I treated without a tube a tubercular sequestrum was removed from the acetabulum and caseous tubercular material was scraped from a cavity within the pelvis, between it and the obturator internus muscle. Healing by first intention was nevertheless obtained. An equally successful result was achieved in the case operated upon by the posterior incision. The natural relation of parts was disturbed as little as possible; the neck of the femur was divided without dislocating the head of the bone, and the latter was removed by forceps.

If the skin over a tubercular joint be sound, notwithstanding the presence of a caseous abscess, the joint is aseptic, and if the whole of the tubercle be removed and the joint be left aseptic, there is no reason why the joint should not heal soundly and remain sound.

If a tubercular focus in the subcutaneous tissue be freely laid open and completely removed, the wound if closed will heal by first intention and remain sound.

It is here suggested that the only difference, from a surgical point of view, between the subcutaneous tubercular focus and one in a joint is that in the latter we have to do with a more complicated cavity and consequently with one from which it is more difficult to remove the tubercle completely. If the tubercle be as thoroughly removed from a joint as it can be from a subcutaneous focus the former will heal just as well as the latter. There was an abscess in each of the four cases of hip disease referred to above. The acetabulum was bare in all, but it was perforated in only one. In the latter case it was not possible to be sure that the whole of the diseased tissues had been removed from the interior of the pelvis, and the sequel of the case showed that they had not all been removed. After the joint had been healed for three months a tubercular focus appeared beneath the scar. This was incised, and on scraping away the tubercle a track leading to the perforated acetabulum was found. The tissues about were firm and healthy. This case shows that an

excised hip may heal notwithstanding the presence of tubercle, but it also shows that the chances of a permanent cure are slight unless all the tubercle be removed.

It is possible for recurrence of the disease to take place in any case, but the fear of recurrence should not prevent an attempt being made to get rapid healing; for, if the wound heals by first intention, the inflammation of the tissues must be very slight and entirely limited to the parts injured, and consequently the vitality of the tissues will be but little impaired and their powers of resistance to the invasion of tubercle will be but little diminished.

P.S. (May 9th, 1889).—The two cases referred to first in the above paper have had no relapse. In the case operated upon by the posterior incision a fresh abscess formed in front of the joint; it is not yet healed. In that in which the acetabulum was perforated it has been necessary to scrape the sinus again; it is now healed.

(For report of the discussion on this paper, see 'Proceedings of the Royal Medical and Chirurgical Society,' Third Series, vol. i, p. 33.)

EIGHTY CASES OF CHOREA:

ANTECEDENTS, FAMILY HISTORY, STATE OF THE HEART, AND SUBSEQUENT HISTORY.

BY

W. P. HERRINGHAM, M.D., F.R.C.P.,

PHYSICIAN TO THE WEST LONDON HOSPITAL, AND TO THE PADDINGTON GREEN CHILDREN'S HOSPITAL.

Received March 22nd, 1888—Read January 8th, 1889.

ABBREVIATIONS.

F. Father. M. Mother. B. Brother. S. Sister. rh. Rheumatism. rh. f. Rheumatic fever. ch. Chorea. Ht. ap. n. l. Heart-apex in nipple line. Ht. ap. ins. or outs. Heart-apex inside or outside nipple line. Imp. + Heart impulse greater than natural. 3 w. + Three weeks after first visit.

THE following remarks are based upon the examination of eighty consecutive cases of chorea occurring in my practice at two general hospitals. The cases were nearly all out-patients, but eight of them were admitted to the wards for chorea, and in two it occurred while in hospital for rheumatism. I directed my attention to the personal history of the patients, to the history of disease in their families, and to the state of their hearts at the time of attendance. I have seen nearly half the total number at various intervals subsequently, and have been careful to note the state of the heart at the time of their subsequent attendance.

In examining the personal and family histories for the causes of the chorea, inquiries were made first for an *exciting* cause, such as fright, or shock, or injury; next or in default of this for *predisposing* causes, rheumatism, other ill-health, or prolonged mental strain. The remaining cases, in which none of the above could be discovered, are divided into those with and those without previous attacks of chorea, the first group being again subdivided into those who alleged a cause for the first attack, and those who could not.

In writing out the cases, however, it has been more convenient to place the rheumatic cases by themselves. They have been subdivided into classes. The first contains four cases of patients in whom the chorea for which they were treated followed immediately upon rheumatic fever; the second, three cases wherein, though the present attack was not, the first had been, immediately preceded by rheumatic fever. In the third are twelve cases in which the connection was not immediate, but the rheumatic fever had occurred at an interval varying from two weeks to four years before the first attack of chorea. The fourth class is formed of two cases in which there had been no previous rheumatism, but acute rheumatism came on during the attack of chorea. The evidence for the rheumatic fever is in most cases the statement of the patient's friends, but in Cases 1, 2, 9, 11, 19, 20, and 21 my own observation. I do not think, however, that doubt need be thrown upon the first kind of evidence in this matter for rheumatic fever is not likely to be confounded with other diseases occurring at this time of life; they depend always, or nearly always, upon the statement of a medical man, and often upon the diagnosis of a hospital physician.

The fifth and sixth classes contain those cases in which a clear history could be obtained of occasional pains in the joints or of definite attacks of such pains, but in which no swelling or fever was noticed. These cases cannot be said with such certainty as the preceding to be of a rheumatic character, but the labours of others during recent

years have rendered it at least probable that such pains in early life are really rheumatism.

The first four classes contain twenty-one cases, more than a quarter. The addition of the fifth and sixth brings the total (including Case 40) to thirty-seven, very nearly half of the whole number.

In the seventh class are placed six cases in which a definite cause was alleged to have excited the disease. In the first, No. 37, that cause was physical injury to the head, fright being excluded, and it is interesting to compare this with other cases such as that of Dr. McLeod (No. 365 in the Collective Investigation Report[1]), in which a woman aged forty immediately upon severe head injuries became choreic and maniacal. It appears at least possible that a visible injury to the brain or meninges may have occurred in these cases. The remaining five cases are all of mental origin, and these are the only five in which I could extract from child or parent a history of such an exciting cause. Many of them have said to me, in reference to this or a previous attack, "Well, sir, the doctor said it was caused by a fright," who have been quite unable to give such a history themselves. Seeing that the children are in almost every instance old enough to recollect and speak for themselves, we need only allow for those few cases in which, the fright having been caused by the parent, she was ashamed and the child afraid to mention it. There are four other cases, Nos. 25, 56, 57, 58, in which the first attack was ascribed to a definite exciting cause of a similar nature. While therefore the descriptions leave no doubt of the connection, the class formed by such cases remains small.

The eighth class is formed by four cases in which chorea was preceded by some definite ill-health, and although in two of them, Nos. 44, 46, this may be perhaps but a premonitory stage of chorea itself, the remaining two, Nos. 43, 45, were ill of catarrhs which can scarcely be thus explained.

[1] 'Brit. Med. Journ.,' 1887, i, 425.

With these must be considered Cases 22, 23, 24, 35, in all of which considerable ill-health existed previously to the chorea; for predisposing causes do not exclude, but assist one another.

But another predisposing cause was found in the cases composing the ninth class. Some of these patients gave a history of worry, as No. 53, a servant under a harsh master, or No. 34, a young woman who was at strife with her family, or No. 39, a little girl who worked twelve hours a day at boot-finishing. Others had just returned to school after a long absence, as Nos. 5, 19; and the remainder, fifteen in all, were working hard at school, most of them preparing for an examination, and often giving evidence by sleep-talking that their lessons were too much for them. In Cases 31 and 55 two attacks had occurred, each just before an examination.

The remaining twenty-five cases afforded no clue to any definite predisposing or exciting cause beyond the fact, that Nos. 56 to 66 inclusive, forming the tenth class, had already had one or more attacks of chorea.

It was, however, of interest to carry the investigation yet further, and, like Dr. Isambard Owen, in the 'St. George's Hospital Reports,' to inquire what lesser ailments were to be found among patients affected with chorea. In four cases the history could not be obtained. In thirteen others the appearance was one of strength, or there was no history of any common ailments; but of these No. 10, George Y—, though a strong, stout-built boy, was looking pale and weak when I saw him from his recent illness, and No. 34, Charlotte A—, looked of strong physique, but was of very unstable nervous system. There was only one patient, No. 74, James S—, whom I should have called very strong. He was when I first saw him a strong, stout lad, and he is now the picture of health and strength. No. 1 could not detail any ailments, but was a very delicate-looking girl.

In all the other sixty-two cases there was a common ailment to which the patient was often subject, and in

many there were several. Of these headaches were the most common, being noted in twenty-eight instances. There were seven of these patients in whom the headaches were combined with vomiting. In two they only came on after reading.

Indigestion of various sorts, chiefly an inability to eat rich food, is noted in fourteen, of which one was a boy, No. 47, who ate no meat, or very little.

Eczema squamosum was seen on the face in nine, blepharitis in two, and the scars of cervical abscesses in three cases. Another boy, No. 60, was said to have sores on the body, probably eczema, not infrequently.

Sore-throats were noted in six cases, colds and coughs in three, and bronchitis occurred in seven others, while one, No. 25, showed a well-marked rickety chest. Nervous disorders are not so frequently complained of. One child had chronic incontinence of urine, another was a bad sleeper, four had "faints," which may possibly have been epileptic, and four others, including all the grown-up girls, were hysterical. One of these was a pregnant married woman; another was married but not pregnant.

Twenty-six, including several of the preceding, were described by their mothers as "delicate," "never strong," "always ailing," or the like, and in two, Nos. 5 and 32, this delicacy is said only to have existed since an attack of acute rheumatism.

It may be noted that of the cases which were not delicate the larger number were not rheumatic. It could not therefore be said that general delicacy always took the place of rheumatism, where this latter was not present, as a predisposing cause.

At the same time that this examination of the personal history was made the family history of each patient was also investigated. Except in respect of rheumatism and chorea it is not worth while to examine these minutely, and the former must be confined to rheumatic fever, for rheumatism in the mouths of the laity means every pain but colic.

Rheumatic fever had occurred in twenty-five out of seventy-five families. In five the records were wanting. Two thirds of these, seventeen families, belonged to rheumatic patients. The remaining eight families are distributed among forty-one patients in whom no history of rheumatism could be obtained.

Chorea had occurred in twelve families.

Chorea and rheumatism had occurred in nine families.

In one case, No. 4, when the patient had chorea, a younger brother was reported to have had chorea, but no rheumatism. Two years later I attended this brother for rheumatism. In four cases chorea and rheumatic fever had occurred in the same member of the family.

Minor ailments.

Strong looking or with no minor ailments, 10, 13, 30, 34, 37, 38, 42, 62, 63, 65, 68, 72, 74.

Headaches, 2, 3, 5, 6, 7, 12, 14, 17, 20, 22, 28, 31, 32, 33, 34, 36, 40, 45, 52, 53, 55, 57, 62 A, 66, 67, 69, 76, 77.

Indigestion, 6, 7, 15, 21, 36, 45, 46, 47, 52, 60, 66, 67, 75, 76.

Eczema, 6, 14, 22, 26, 32, 34, 39, 60 (prob.), 66, 67.

Blepharitis, 56, 58.

Cervical abscess, 54, 66, 70.

Sore-throats, 16, 22, 26, 45, 47, 80.

Colds and coughs, 6, 28, 36.

Bronchitis, 23, 24, 26, 52, 57, 71, 80.

Rickety chest, 25.

Incontinence of urine, 51; bad sleeper, 22; "faints," 34, 48, 53, 69; hysteria, 18, 29, 34, 42.

Said to be delicate, 5, 6, 7, 8, 14, 16, 17, 22, 26, 28, 32, 35, 39, 40, 43, 52, 54, 55, 58, 60, 61, 71, 75, 77, 78, 79.

Family history.

Rheumatic fever, 1, 2, 4, 6, 7, 8, 12, 13, 15, 16, 17, 23, 24, 27, 30, 36, 39, 40, 55, 57, 58, 70, 71, 72, 77.

Chorea, 4, 7, 8, 15, 16, 35, 36, 52, 55, 57, 58, 64.

Chorea and rheumatic fever, 4, 7, 8, 15, 16, 36, 55, 57, 58.

The condition of the heart was noted in almost every instance at each visit, and the examination was made in a uniform manner:—first in the erect position; then if there was no murmur or the signs were equivocal, the patient was made to exert himself and re-examined; and if still without a result he was examined while lying down. The apex was noted as being at the furthest point downward and outward where the impulse could be distinctly felt. The patients were all written to subsequently, and as the result of this in thirty-seven cases they were examined after the disease had ceased. The interval at which this was done varied from a few months to four years after the original attack. It is stated both in the Tables and in the following summary.

A. The heart was natural in ten cases[1] (Nos. 15, 24, 26, 32, 34, 37, 42, 57, 59, 62).

No. 15.—2½ years later. No ch. or rh. since.[2] Heart natural.

No. 24.—3 years later. No ch. or rh. since. Heart natural.

No. 32.—1¾ years later. Came for fresh chorea, no rh. since. Had a presystolic murmur.

B. There were uncertain signs of disease in the following:

1. *Heart-apex natural, first sound indistinct* in three cases (Nos. 8, 17, 70).

No. 17.—3 years later. Ch. thrice but no rh. since. Heart-apex outside nipple line, a systolic murmur, and accentuation of the second sound at the left base.

[1] If it be remembered that Cases 1 to 36 and Case 40 are rheumatic it is easy to see by each list how many rheumatic cases it contains.

[2] Here as in the subsequent Tables "no rh." means no rheumatism of any sort, either acute, or mere joint pains.

2. *Heart-apex natural at first, but going outwards, no murmur,* in four cases (Nos. 31, 48, 51, 65).

No. 31.—2¼ years later. No ch. or rh. since. Heart-apex in nipple line.

No. 51.—1 year later. Came for fresh chorea. Heart-apex in nipple line.

3. *Heart-apex in nipple line at first, but going inwards, no murmur,* in four cases (Nos. 4, 9, 66, 77).

No. 4.—2½ years later. No ch. but rh. and purpura since. Heart-apex in nipple line.

No. 9.—3 years later. Ch. with slight rh. once since. Heart-apex just inside nipple line. Prolonged first sound, accentuated second sound, excessive impulse.

No. 66.—3 years later. No ch. or rh. since. Heart natural.

No. 77.—2¾ years later. Slight choreic movements since. Heart-apex in nipple line.

4. *Heart-apex natural, murmur inconstant;* one case (No. 76).

5. *Heart-apex natural, murmur constant,* in five cases (Nos. 3, 10, 28, 29, 67).

No. 28.—2¾ years later. No ch. or rh. since. Heart the same. No accentuation of second sound.

No. 29.—2¼ years later. No ch. or rh. since. Heart-apex in nipple line, loud systolic apex murmur, second sound accentuated.

No. 67.—7 months later. No ch. or rh. since. Heart-apex in nipple line. No murmur.

6. *Heart-apex at first natural, going outwards, murmur throughout,* two cases (Nos. 14, 20).

No. 14.—2½ years later. Slight ch. now, rh. once since. Heart-apex in nipple line, first sound prolonged, occasional murmur after exertion, second sound accentuated at left base, and impulse rather increased.

No. 20.—2 years later. Slight rh. since, no ch. Heart-apex in nipple line, systolic murmur, second sound accentuated.

7. *Heart-apex in or outside nipple line, no murmur,*

sixteen cases (Nos. 7, 13, 22, 27, 38, 39, 45, 47, 49, 50, 60, 61, 69, 73, 75, 79).

No. 22.—6 months later. A systolic murmur. 3½ years later. Apex the same. No murmur. Impulse increased, second sound accentuated.

No. 27.—Some months later in a fresh attack. A systolic murmur heard.

No. 39.—3½ years later. Ch. once, no rh. since. Apex outside nipple, no murmur, second sound accentuated.

No. 45.—4 months later. No ch. or rh. since. Heart same.

No. 50.—3 years later. Ch. once, no rh. since. Heart-apex outside nipple, a short systolic murmur.

No. 60.—5 months later. Heart natural.

No. 61.—3 years later. No ch. or rh. since. Heart-apex in nipple line.

c. There were sufficient signs to warrant a diagnosis of organic disease in twenty cases (Nos. 1, 2, 5, 6, 11, 12, 16, 18, 23, 35, 36, 53, 54, 56, 58, 63, 64, 71, 72, 80).

Eight cases were seen again. In all the diagnosis was confirmed (Nos. 5, 11, 12, 16, 23, 36, 58, 71). A few had had ch. since, attended for a fresh attack, none had had rh. since.

d. A murmur developed during observation in the following cases:

1. *With the apex starting as natural*, six cases (Nos. 19, 30, 40, 44, 46, 52).

No. 40.—6 months later. Every sign of organic disease. 2½ years later. No murmur, but other signs remain. No rh. or ch. since. 3½ years later apex returned within n. l., no murmur.

No. 52.—3 years later. No ch. or rh. since. Heart-apex outside nipple line; loud systolic murmur heard behind. Congested cheeks.

2. *With the apex in or outside nipple line at first examination*, five cases (Nos. 21, 43, 55, 74, 78). In No. 74 the murmur had the character of functional affections.

No. 43.—6 months later. Came for fresh ch. Heart natural.

No. 74.—3 years later. No ch. or rh. since. Heart natural.

No 78.—6 months later. No ch. or rh. since. Heart-apex in nipple line. Murmur remained.

E. In the following four cases a murmur was heard at first and vanished during attendance (Nos. 25, 33, 62A, 68).

No. 62A.—3¾ years later. Came for fresh ch. No rh. since. Heart natural.

No. 68.—6 months later. No ch. or rh. since. Heart-apex in nipple line; no murmur.

It appears therefore that of those hearts which were healthy then, one subsequently became diseased without fresh rheumatism; that of those which clearly had organic disease, all who were seen later remain the same, or are in worse condition; and that of the doubtful cases two (Nos. 60, 66) became healthy, while seven (Nos. 9, 17, 20, 22, 27, 29, 50) present sufficient evidence of organic disease, and ten (Nos. 4, 14, 28, 31, 39, 45, 51, 61, 67, 77) remain uncertain.

The chief interest, however, centres round the remaining groups D and E. Those murmurs which vanish during chorea appear, to judge from two examples, not to leave permanent effects behind them. Of eleven cases in which a murmur developed during observation, five were re-examined, and of these, three gave good evidence of organic disease, and two were natural.

Besides the cases above mentioned, another patient, Hester S—, æt. 13, came under my care for bronchitis, who had two years before been an in-patient under Dr. Gee for chorea. When admitted the heart was natural, but on the twenty-third day a soft systolic murmur was audible. When under my care the heart's apex was just inside the nipple line, and there was a faint but distinct systolic murmur.

These four cases appear to give clear evidence of the permanence of a cardiac murmur directly produced by chorea, and of its organic nature. Corroborative evidence is afforded by three cases, Nos. 5, 32, and 58. These had pre-

viously attended for another attack of chorea, and the heart was at that time noted as natural. No rheumatism or other illness had occurred in the interval, and it seems a fair inference that in these cases also the murmur, which time has proved to be of organic origin, was due to chorea alone.

The post-mortem evidence is in accord with these inferences; for, on the one hand, some few fatal cases have shown no signs of endocarditis, even though carefully examined upon that point, and, on the other, many of the cases with cardiac disease show changes so recent that they to all appearance followed rather than preceded the chorea.

Nor can it be said that it is only in rheumatic patients that chorea produces cardiac disease. No trace of rheumatism could be found in Nos. 52, 58, or 78, and in only one of these, No. 58, was there any rheumatism in the family.

It may well be that chorea had caused cardiac disease in other cases, but though they prove concurrence, they cannot from the first when morbid signs are present, prove causation, since the heart affection may have preceded the chorea. On the other hand, they cannot be used to prove that heart disease produces chorea, for hardly any cases come in the first week (only six of the eighty), and the murmur in one of the above-mentioned instances developed before the seventh day.

From these cases the following conclusions may be drawn:

1. That a large number of choreic patients are liable to rheumatism.

2. That choreic patients are nearly always of a delicate constitution.

3. That chorea is sometimes directly caused by emotion.

4. That chorea may cause permanent heart disease.

5. That it also gives rise to signs of cardiac disease which are not permanent.

CLASS I.—*Cases in which present attack was immediately preceded by Acute Rheumatism.*

No.	Name, age, date.	History of rheumatism.	Personal history.	Family history.	State of heart.	Subsequent history.	Remarks.
1	Mary C., 10, Feb., 1885	Sore-throat, followed by illness confining her to bed, in which joints were inflamed; on getting up was found choreic	Delicate looking; no other illness or ailment	F. and 3 B. strong; M. rh. f.; 1 S. corneal scars, and now keratitis	Ht. ap. n. l.; syst. ap. mur.	—	—
2	Maud O., 15, March, 1885	Rh. f. twice; inpatient for 2nd attack; up a few days before onset of ch.	Delicate looking; no other illness; headaches	F. ?; M. delicate, indigestion and rh.; 1 S. (18) just had rh. f.; 5 B. and S. strong	Ht. ap. n. l.; syst. ap. mur. heard behind before ch., and so remained	Aug., 1885. — Heart same	—
3	Walter S., 11, May, 1885	Rh. f. 3 months ago; just got up when ch. began	No other illness; headaches	All strong	Ht. ap. ins.; syst. mur. loudest over pulm. vs. throughout; pulse irregular at first	—	—
4	James S., 11, Dec., 1885	2 weeks ago laid up with pains in limbs; could not move legs because of pain	Scarlatina with dropsy 6 years ago	F. rh.; M. and 6 B. and S. strong; 1 B. ch. (this B. seen Feb., 1888, has had subacute rh. for 3 months, and has syst. ap. mur.)	Ht. ap. n. l.; first sound prolonged at ap.; 3 weeks + ht. natural	Feb., 1888. — Ht. ap. palp. in n. l., 5th sp., but most distinct ½ in. ins. n. l.; no mur. Was under treatment 2 months ago for swellings in many joints and "bruises" all over legs; doctor said it was "rheumatism"	Working hard for examination.

See also Case 9.—Subsequent history.

Class II.—*Cases attended for a later attack, in which the first was immediately preceded by Acute Rheumatism.*

	5	Sophia M., 11, April, 1885	Rh. f. at 6 and 9; first ch. began while in bed with rh. f.	2nd attack of ch.; delicate since rh. f.; sleeps badly; subject to pains in head; eczem. squam. on face	All strong	1 year ago under treatment for ch.; ht. then noted as natural in clerk's notes; no illness since; now ht. ap. n. l., syst. mur.	Feb., 1888.—Now attending for 3rd ch.; no rh. since 1885; ht. ap. n. l., action irregular; soft syst. ap. mur. not heard in axilla (Dr. Garrod)	Just at onset she had returned to school after an absence of 18 months.
	6	Eliza M., 11, Feb., 1885	Rh. f. 9 months ago; ch. during convalescence	2nd attack; always delicate; sick headaches, indigest., colds, coughs; eczem. squam. on face	F. rh.; M. bronch.; 1 B. rh.; 2 S. weakly, 1 S. rh. f.	Ht. ap. ½ in. outside n. l.; syst. ap. mur.	May, 1885.—Ht. same	No warning or cause.
	7	Elizabeth W., 8, Dec., 1885	Rh. f. 2 years ago; ch. during convalescence	2nd attack; always very delicate; appetite bad, dainty; sore spots on tongue and sick headaches	F. much cough; M. rh. f. at 15, and ch. during convalescence; 2 B. and S. no rh. or ch.	Ht. ap. n. l.; imp. natural; no mur.	—	Was studying hard for examination, doing home lessons, and talking of them in her sleep at onset.

Class III.—*Cases preceded by Acute Rheumatism, but not immediately.*

6	8	George K., 16, Nov., 1884	4 months ago laid up 2 months with pain and swelling in knees	Not strong; no definite ailment	F. strong; M. rh. f.; 7 B. and S. all rheumatic; 1 S. rh. f., and ch. during convalescence	Ht. ap. natural; 1st sound indistinct	May, 1885.—Ht. ap. n. l.; 1st sound indistinct, no mur.	No cause known.

No.	Name, age, date.	History of rheumatism.	Personal history.	Family history.	State of heart.	Subsequent history.	Remarks.
9	Minnie L., 10, Sept., 1884	6 months ago severe attack of rh. pains	2nd attack (first was soon after the rh.)	—	Ht. ap. n. l.; no mur. 8 weeks + ht. ap. just inside n. l.; no mur.	Sept., 1885.—Another attack, immediately preceded by swelling of finger-joints and right knee. Ht. ap. n. l., at first no mur., but 6 weeks + occasional syst. ap. mur. Aug., 1887.—Ht. ap. just inside n. l.; 1st sound prolonged, hardly long enough to call a mur.; 2nd sound + at left base; impulse +	No cause known.
10	George Y., 15, Jan., 1885	Rh. f. Nov., 1884. Went to work at Christmas, looking pale and weak. Ch. began 2 weeks later	Stoutly built; no other illness or ailment	All strong	Ht. ap. inside n. l.; loud syst. ap. mur.; pulse small	—	No cause, unless work.
11	Arthur Q., 12, March, 1885	Rh., under me 3 months ago	—	F. died phthisis; rest strong	Ht. ap. n. l.; syst. ap. mur.	Aug., 1885.—Ht. ap. n. l.; loud syst. ap. mur.	No cause.
12	Jessie K., 6, April, 1885	Rh. f. Sept., 1883. 1st attack of ch. Nov., 1883	2nd attack; sick headaches; no other illness	F. rh. f.; M. delicate; 2 B. and S. strong	Ht. ap. outside; loud syst. ap. mur.	An attack of rh. supervened; 2 months later double apex murmur March, 1888.—No rh. or ch. since, but has been in Vict. Park Hosp. for heart; very loud murmurs at ap. and base	Worrying much with school work.
13	Anna S., 16, May, 1885	Rh. f. 4 years ago	No other illness or ailment	F., M., and 3 S. strong; 1 S. rh. f. twice	Ht. ap. n. l.; no mur.	—	No cause.

14	Ellen P., 10, Oct., 1885	6 months ago laid up with rh. in knees	Measles twice; always ailing; headaches; ecrem. squam.	All strong	Ht. ap. natural; faint syst. mur. on exertion; 3 weeks + ht. ap. n. l.	March, 1888.—Ch. now slightly in left arm; rh. once in ankle since. Has to work very hard. Bronchitis. Ht. ap. in n. l.; impulse +; 1st sound prolonged; occasional mur. after exertion; 2nd sound + at left base	Working hard for examination at onset, but not complaining of work.
15	Joseph C., 13, Sept., 1885	Rh. f. 5 months ago; always pain in feet since	Very subject to bilious attacks	F. rh. in feet; M. ch. when young; 1 B. had rh. f., followed by ch., and died of ht. disease; another B. (8) has had rh., ch., and has extreme mitral disease; 3 S. (11, 7, 2) are strong	Ht. ap. ½ in. inside; no mur.	March, 1888.—No rh. or ch. since. Ht. natural, except for reduplication of 1st sound at apex	—
16	Annie T., 7, Sept., 1884	6 weeks an illness in which throat sore, and in bed 2 weeks	Delicate looking; subject to sore-throats; never strong; no other illness	F. rh. f.; M. rh. f. thrice; 1 S. hysterical fits, rh. f., and ch.	Ht. ap. ½ in. outside n. l.; syst. ap. mur.	May, 1885.—Ch. again; ht. a loud syst. ap. mur.	Previous illness thought to be rh. because of severity, state of heart, and family history. It was not, as far as could be found, scarlatina.
17	Charlotte G., 6, Jan., 1885	Rh. f. 3 months ago; ch. began 2 months later	"Low fever" 3 years ago; ailing some mos. lately; always delicate; headaches	F. rh. f.; M. and 3 B. and S. strong	Ht. ap. inside n. l.; 1st sound indistinct	Feb., 1888.—Ch. thrice since; no rh. since; still delicate, and very subject to headaches; ht. ap. just outside n. l., 5th space; syst. mur. faintly audible at ap., but occasionally uncertain; 2nd sound + at left base	No cause known.

No.	Name, age, date.	History of rheumatism.	Personal history.	Family history.	State of heart.	Subsequent history.	Remarks.
18	Maria H., 27, July, 1886	Rh. f. 8 years ago; often rh. pains	4th attack; hysterical	F., M.. and 5 B. and S. have died in 2 years of lung disease	Ht. ap. n. l.; pre-syst. mur.	—	Pregnant; hysterical paralysis and anæsthesia.
19	Edith B., 10, Nov., 1887	Sept., 1887.—Swelling and pain in knees. Had been 2 wks. at school when in Nov. ch. began, and in 3rd week of ch. rh. returned in other joints	—	—	Ht. ap. ½ in. inside; sounds clear. Admitted with rh., and while in bed a syst. mur. occasionally heard. 8 weeks + ht. ap. n. l.; soft syst. mur. at ap., louder on exertion	—	Had been 2 weeks at school.

Class IV.—*Cases not preceded, but accompanied, by Acute Rheumatism.*

20	George W., 11, Jan., 1886	In 5th week of ch. acute rh. supervened	2nd attack of ch.; many headaches; no other illness	F. strong; M. sick headaches; 7 B. and S. no rh. or ch.	Ht. ap. ½ in. inside n. l.; syst. ap. mur.; the ht. ap. went out to just inside n. l. under observation	March, 1888.—No ch. since, but slight rh. in kneesandankles; none in family; ht. ap. palp. in n. l.; strongest ½ in. inside n. l.; soft syst. ap. mur., increased on exertion, and then heard in axilla; 2nd sound + at left base	No cause known.
21	Anne W., 9, Sept., 1887	In 8th week of ch. acute rh. supervened	Always dainty, but no other illness	F.?; M. dead; no B. and S.	Ht. ap. in n. l.; a syst. mur. at first only after exertion, later constant	—	No cause known.

CLASS V.—*Cases preceded, but not immediately, by pains in the Joints, though with no history of Acute Rheumatism.*

22	Emily H., 12, Nov., 1884	Occasional pains in joints	Always delicate; headaches, sore-throat; sleeps badly; eczem. squam.	All strong	Ht. ap. in n. l.; imp. +; no mur.; 1st sound became indistinct	May, 1885.—A syst. ap. mur. heard. Feb., 1888.—No ch.; no rh. since; strong and healthy. Ht. ap. in n. l.; imp. +; no mur. anywhere; sounds loud; 2nd sound + at left base	Ailing 2 months since ulcerated throat.
23	John L., 11, Feb., 1884	Occasional pains in joints	2nd attack; 1st 1 year ago; bronchitis; had a fit in sleep during 1st attack of ch.	F. died phthisis, had rh. badly; M. and 3 S. strong; 1 S. anæmia; 1 S. rh. f.	Ht. ap. in n. l.; loud syst. ap. mur.; pulse irregular	Feb., 1885.—Another attack; ht. as before	All three attacks preceded by catarrh.
24	Jane J., 11, Feb., 1885	Occasional pains in joints	Bronchitis	F. rh. f.; 1 S. rh. f.; 1 S. fits; M. strong	Ht. natural	Feb., 1888.—No ch.; no rh. since then; headaches and bilious attacks; ht. natural	Poorly for some months previous.
25	John L., 16, March, 1885	Occasional pains in joints	2nd attack; 1st 1 year ago; inflammation of lungs; rickety chest	F.?; M. and 1 B. strong	Ht. ap. in n. l.; syst. ap. mur., but during observation the ap. retreated to natural, and the mur. disappeared	—	1st attack after fright by cab; left work 2 weeks after fright.
26	Margaret C., 10, May, 1885	Occasional pains in joints	Always delicate; bronchitis and sore-throats; eczem. squam.	F. strong; M. and 8 B. and S. weakly	Ht. ap. just inside n. l.; no mur.; pulse irregular	—	Ch. began just before an examination, about which much excitement and work.
27	Louisa R., 9, Nov., 1883	Occasional pains in joints	Ch. off and on ever since 6	F. and M. rh., 1 S. rh. f.	Ht. ap. ½ in. outside n. l.; no mur.	Some months later another attack, in which syst. mur. audible	No cause known.

No.	Name, age, date.	History of rheumatism.	Personal history.	Family history.	State of heart.	Subsequent history.	Remarks.
28	Florence B., 14, July, 1885	Occasional pains in joints	Ch. yearly since 7; never strong; headaches, coughs; necrosis of sept. nasi and floor of orbit	F. rh. badly; M. strong; no B. and S.	Ht. ap. natural; syst. ap. mur. on exertion throughout	March, 1888.—Ch. once since; no rh.; ht. ap. normal; imp. not+, but a syst. ap. mur. constant though faint; louder after exertion; 2nd sound natural	No cause known.
29	Susan P., 21, Dec., 1885	Occasional pains in joints	Hysterical; no ailments	M. sick headaches; F. and all rest strong	Ht. ap. ½ in. inside n. l.; syst. ap. mur., which was strongly musical	March, 1888.—No rh. or ch. since; ht. ap. faintly palp. in n. l.; strongest imp. ½ in. inside n. l.; loud syst. ap. mur. heard outwards; 2nd sound + at left base	No cause known.
30	Clifford W., 15, Nov., 1885	Pains in joints, especially knees, for 6 months	Always strong; no ailments	F. dead, no rh.; M. rh. f. 4 times, mitral disease; 7 B. and S. strong	Ht. ap. just inside n. l.; 1st sound prolonged; later ht. ap. in n. l.; syst. ap. mur.	—	No cause known.
31	Rose L., 10, Dec., 1885	Occasional pains in joints	2nd attack; 1st 2 years ago; headaches	No rh. or ch. in F., M., or 8 B. and S.	Ht. ap. just inside n. l.; imp. +; 1st sound booming; 2nd sound + at left base; later ht. ap. went to n. l.; sounds clear	March, 1888.—No rh. or ch. in self or family since; ht. ap. in n. l.; no mur.; 2nd sound not +	Both attacks came on just before an examination.
32	Peter T., 10, Feb., 1886	Occasional pains in joints	2nd attack; 1st 1 year ago; strong and stout till then; headaches and eczema since	No rh. or ch. in F., M., or 6 B. and S.	Ht. ap. just inside n. l.; no mur.	Nov., 1887.—Presystolic mur. on exertion	No cause known.
33	Alice G., 9, Jan., 1886	Pains in knees a few months ago	Much headaches last 3 months; no ailment or illness till then	F. rh. badly; M. and 7 B. and S. strong	Ht. ap. in n. l.; syst. ap. mur., but later the mur. disappeared	—	No cause known.

34	Charlotte A., 18, May, 1886	Occasional pains in joints	Stout, strong; hysterical; perhaps epileptic; ch. twice before; sick headaches; eczem. of face	F. and M. rh.; no rh. or ch. in B. and S., but all weakly; 2 died consumption	Ht. natural	—	Domestic worry and quarrelling.
35	Minnie T., 8, April, 1887	Occasional pains in joints	2nd attack; 1st 4 months ago; always delicate and dainty	F. rh.; M. ch. when young; 2 B. and S. (younger) strong	Ht. ap. in n. l.; loud syst. ap. mur.	—	For a week before onset had a bad catarrh, which greatly weakened her.

See also Case 40.

Class VI.—*Cases not preceded, but accompanied, by pains in Joints.*

36	Annie A., 11, June, 1885	Ch. began with pains in knees; no previous rh.	No other illness; often sick headaches; appetite variable; colds and coughs	F. died ht. disease; M. bad rh., never rh. f.; 1 S. ch. thrice; 1 S. eczem., delicate; 1 S. mitral disease and bronchitis, but no history of rh. or ch.	Ht. ap. n. l.; syst. ap. mur.	Sept., 1887.—Another attack; ht. ap. just inside n. l.; short syst. ap. mur. on exertion. Dec., 1887.—Ht. same	Ch. was left side only, but pains in both knees. Working very hard, and worrying about examination.

See also Case 40.

Class VII.—*Cases preceded by Injury, Shock, or Violent Emotion.*

No.	Name, age, date.	History of exciting cause.	Personal history.	Family history.	State of heart.	Subsequent history.	Remarks.
37	William G., 10, May, 1885	While in usual health fell, cut his head; unconscious for a short time; vomited; 2 days later ch. began	No illness or ailment	F. and M. strong	Ht. ap. inside n. l.; no mur.	—	—

No.	Name, age, date.	History of exciting cause.	Personal history.	Family history.	State of heart.	Subsequent history.	Remarks.
38	Sarah C., 14, Jan., 1884	2 days before onset frightened by a lodger jumping out at her on stairs	No illness or ailment	No rh. or ch. in family	Ht. ap. 1 inch outside n. l.; no murmur	—	—
39	Elizabeth B., 14, Sept., 1884	2 days before onset B. taken to hospital, at which "she cried and went on dreadful"	No illness or ailment, but not strong; eczem. squam.	F. delicate, rh. f.; 1 B. phthisis; 1 B. strong; 4 S. all delicate	Ht. ap. in n. l.; imp. +; no mur.; later ht. ap. outside n. l.	April, 1885.—Ht. ap. ½ in. outside; no mur. Feb., 1888.—Ch. once since note; no rh.; ht. ap. ½ in. outside n. l. in 5th sp., but most forcible ½ in. outside n. l., 4th sp.; no mur.; 2nd sound + at left base	Working at boot-finishing, 8 a.m. till 7 p.m.
40	Annie C., 16, June, 1885	At 2 p.m. suddenly told F. was dead (information quite unexpected and false), greatly frightened; at 4 p.m. vomited; at 7 p.m. twitching noticed	Scarlatina eight years ago; rh. occasionally in hands and feet; headaches; pains in belly; never strong	F. rh. f.; M. rh. f., mitral disease; no B. and S.	Ht. ap. natural; sounds clear; 7 days + a soft syst. mur. at ap. and outwards; 3 weeks + ap. just outside n. l.	Dec., 1885.—Ht. ap. n. l.; imp. +; syst. mur. at ap. and behind; 2nd sound + at left base. March, 1888.—No illness at all since; ht. ap. in n. l.; no mur.; 2nd sound much + at left base March, 1889. — Apex ins.; no mur. (Dr. Garrod)	—
41	William W., 15, Sept., 1887	Well in morning; during the day nearly killed by engine while crossing line; much frightened; M. noticed twitching when he went home that evening	See Case 62A. No rh. since that note	—	Ht. ap. natural; no mur.	—	—

42	Mary Ann J., 18, Dec., 1887	1 week ago a quarrel, followed by a hysterical fit; ch. noticed ever since.	Ch. at 8; hysterical fit; for 1 month had had pain in heels and feet; strong looking	F. died phthisis; M. strong; neither rh.; no B. or S.	Ht. natural	—	—

See also Case 25.

Class VIII.—*Cases without Rheumatism preceded by slight ill-health.*

No.	Name, age, date.	History of ill-health.	Personal history.	Family history.	State of heart.	Subsequent history.	Remarks.
43	Phœbe H., 13, Oct., 1884	A bad cold, vertical headache, pale, languid, and peevish, just before onset; is always thus before an attack	Ch. twice before; no rh.; hardly ever well	All strong	Ht. ap. in n. l.; no mur., but a syst. ap. mur. developed during observation	6 months later another attack, preceded by 2 weeks of giddiness and pain in vertex; ht. ap. inside n. l.; no mur.	No other cause known.
44	Florence B., 7, Sept., 1884	Pale and ailing 3 weeks	—	—	Ht. natural, but a faint syst. mur. developed under observation	—	—
45	Clara D., 13, Feb., 1885	Several bad colds lately; out of health	Ch. once before; no rh.; sore-throats; sick headaches; dainty; can't eat rich food	F. rh. and insane; M. and 3 B. weakly; 1 B. rh.; 7 S. strong	Ht. ap. in n. l.; sounds natural	4 months later ht. same	Working hard for examination.
46	Samuel B., 7, Feb., 1886	Appetite bad for some time	No rh. or ch.; bilious attacks	F., M., 5 B. and S., all strong	Ht. ap. natural; sounds natural; but during observation ht. ap. went to n. l., and a syst. ap. mur. developed, which was louder on exertion	—	No other cause known.

See also Cases 23, 24, 35.

CLASS IX.—*Cases, without Rheumatism, preceded by hard mental work or worry. Where not otherwise noted, first attacks.*

No.	Name, age, date.	History of mental strain.	Personal history.	Family history.	State of heart.	Subsequent history.	Remarks.
47	Albert S., 9, Nov., 1883	Studying hard	No rh.; sore-throats; eats hardly any meat	M. nervous; otherwise all strong	Ht. ap. in n. l.; imp. +; no mur.	—	No other cause known
48	Gertrude B., 12, Sept., 1884	Working for examination	No rh.; pale for 3 years; subject to "faints" for 2 years	All strong	Ht. ap. inside n. l.; imp. +; no mur.; the ap. beat varied to ½ in. outside n. l., but was in n. l. at end of attack; no mur.	—	No other cause known.
49	Louisa B., 9, Nov., 1884	Working for examination	No rh.; scarlatina 3 years ago; fretful and peevish 2 months	—	Ht. ap. ½ in. outside n. l.; 1st sound indistinct throughout, but no definite mur.	—	No other cause known.
50	Mary Anne S., 13, March, 1885	Studying hard to be a pupil-teacher	No rh.; scarlatina badly at 6	M. died cancer; F. strong	Ht. ap. ½ in. outside at first, retreated to n. l. by end; pulse always very rapid; never any mur.	Feb., 1888.—Ch. once since; never otherwise unwell; strong and healthy; ht. ap. 1 in. outside n. l.; imp. rather +; a slight thrill; a short syst. ap. mur., constant when lying, only occasional when erect; 2nd sound very little +	No other cause known.

51	Maria P., 6, March, 1885	Working hard for examination	No rh.; always nocturnal incontinence of urine	All strong	Ht. nat. at first; ap. went out to n. l.	March, 1886. — A. B. has had it, being "frit with elephants;" she had it again when he was attacked; ht. ap. n. l.; no mur.	No other cause known.
52	Edith D., 11, April, 1885	Worries about lessons, talks of them in sleep	No rh.; bronchitis; always delicate; headaches; indigestion; much out of health last winter	F. and M. weakly; 2 other children, one of whom bronchitis	Ht. ap. inside n. l.; no mur.; a syst. ap. mur. gradually developed under observation	March, 1888.—No rh. or ch. since; still headaches and bilious attacks and bronchitis; ht. ap. outside n. l. in 5th space; loud syst. mur., loudest at ap., heard also behind	No other cause known.
53	Sarah G., 14, June, 1885	A hard place; master harsh; she used to worry and be anxious about it; no definite fright	No rh.; smallpox mildly; "low fever;" "faints" and headaches	F. strong; M. ch. when young; 7 B. and S.; 1 S. ch. thrice	Ht. ap. n. l.; syst. ap. mur. heard behind; pulse irregular throughout	—	No other cause known.
54	Louisa W., 10, July, 1887	Working for examination at onset	No rh.; always delicate; scars of cervical abscesses	F. and M. rh.; B. and S. all strong	Ht. ap. in n. l.; syst. ap. mur.	—	No other cause known.
55	Jane W., 7, Jan., 1888	Working for examination, and worrying about it	No rh.; ch. once before, also while working for an examination; always delicate; headaches lately	F. and M. strong; 1 S. (19) rh. f.; 1 B. (15) ch.	Ht. ap. ½ in. outside n. l. in 5th sp.; no definite mur. at first, but during observation a syst. ap. mur. developed, at first occasionally, then constant, when lying; pulse occasionally irregular	—	Paralytic variety.

See also Cases 4, 5, 7, 12, 14, 19, 26, 31, 34, 36, 39.

Class X.—*Cases without Rheumatism or other cause in which there were previous attacks.*

(A). *With supposed cause.*

No.	Name, age, date.	History of previous chorea.	Personal history.	Family history.	State of heart.	Subsequent history.	Remarks.
56	Harry D., 17, Jan., 1884	Ch. twice before; 1st from fright by a man running after him	No rh.; conjunctivitis and blepharitis	—	Ht. ap. in n. l.; loud syst. ap. mur.	—	No cause for present attack.
57	Annie W., 14, Sept., 1884	Ch. thrice before; 1st at 10 from fright	No rh.; bronchitis; headaches; palpitation of ht.	F. not strong; M. bronchitis; of 9 B. and S., 1 phthisis, 3 bronchitis, 1 "faints," 1 rh. f., ch., and fits, rest strong	Ht. ap. inside n. l.; no mur.	—	No cause for present attack.
58	Hannah P., 11, June, 1885	Ch. once before, 2 weeks after fall downstairs	No rh.; not strong; blepharitis	F. and 5 B. and S. strong; M. rh. f., and ch. when young	Ht. ap. n. l.; imp. +; loud syst. ap. mur. heard behind	In previous attack, 18 months before, ht. is noted by clerk as natural; no illness or ailment between that and this. March, 1888.—Ht ap. outside n. l.; loud syst. ap. mur. heard behind	No cause for present attack.

(B). *Without supposed cause.*

59	Amelia S., 10, Nov., 1884	Ch. relapsing for 1 year, varying from side to side	No other illness	No rh. or ch.	Ht. natural	—	No cause for present attack.

60	Harris W., 16, Feb., 1885	Ch. 4 times in last 5 years, generally in spring	No rh.; sores; is generally weak in winter, with large appetite and indigestion, well in summer, with small appetite and no indigestion	F. died paralysed; M. rh.; of 4 B., 1 phthisis, rest strong	Ht. ap. in n. l.; imp. +; 1st sound indistinct	July, 1885.—Ht. ap. inside n. l.; sounds clear	No cause for present attack.
61	Mary Ann H., 14, Feb., 1885	Ch. once before	No rh.; always delicate	1 S. ch.; no other rh. or ch. in family	Ht. ap. ½ in. outside n. l.; 1st sound indistinct; pulse rapid	Feb., 1888.—No rh. or ch. since, but not strong; ht. ap. outside n. l. in 4th space, in n. l. 5th space; sounds natural	No cause for present attack.
62	Emily C., 16, Feb., 1885	Ch. once before	No rh.; no illness or ailment	All strong	Ht. ap. ? no mur.	—	No cause for present attack.
62 A	William W., 11, Nov., 1883	Ch. once before	No rh.; no illness; headaches on reading lately	No rh. or ch.	Ht. ap. ½ in. outside n. l.; syst. ap. mur., which disappeared during observation	See Case 41	No cause for present attack.
63	Louisa F., 13, Feb., 1885	Ch. once before	No rh.; no illness or ailment	All strong	Ht. ap. in n. l.; loud syst. ap. mur.; apex went outside n. l. under observation	—	No cause for present attack.
64	Alice J., 13, March, 1885	Ch. off and on for 4 years	No rh.	1 B. ch.	Ht. ap. ½ in. outside n. l.; imp. +; syst. ap. mur.; pulse irregular	—	No cause for present attack.
65	Edward W., 16, April, 1885	Ch. once before	No rh.; no illness or ailment	M. dropsy; F. strong; no B. or S.	Ht. ap. inside n. l.; sounds clear; but later ap. in n. l.; sounds indistinct	—	No cause for present attack.
66	Frederick C., 11, April, 1885	Ch. once before	No rh.; cervical abscess; headaches; indigestion; eczem. squam.	All strong	Ht. ap. in n. l.; no mur.; ap. went to inside n. l. during observation	March, 1888.—No rh. or ch. since; ht. natural	No cause for present attack.

CLASS XI.—*Cases without Rheumatism or other cause. First attacks.*

No.	Name, age, date.	Personal history.	Family history.	State of heart.	Subsequent history.	Remarks.
67	Emma T., 8, Nov., 1884	No illness; headaches; indigestion; eczem. squam.	F., M., and 2 B. and S. weakly; no rh. or ch.	Ht.: soft syst. ap. mur. on exertion	June, 1885.—Ht. ap. in n. l.; sounds natural	—
68	Annie B., 7, Dec., 1884	No illness or ailment	M. delicate; F. and 7 B. and S. strong; no rh. or ch.	Ht. ap. in n. l.; syst. mur. at ap. and b., disappearing under observation	April, 1885.—No mur.	—
69	Minnie R., 12, Sept., 1884	No illness; faints; headaches; slight skin rashes	All strong	Ht. ap. in n. l.; no mur.	Jan., 1885.—Ht. same	—
70	Margaret S., 7, March, 1885	No illness; cervical abscesses	M. rh. f.; F. and 3 B. and S. strong	Ht. ap. natural; 1st sound indistinct	—	—
71	Harry G., Nov., 1883	Bronchitis; ? delicate	M. rh. f.	Ht. ap. in n. l.; syst. ap. mur. throughout; 2nd sound + at left base	March, 1885.—Ht. same. March, 1888.—No rh. or ch. since; loud syst. mur. heard in axilla	—
72	Emily D., 12, Feb., 1885	No illness or ailment	F. weak; M. rh. f.; 2 B. and S. strong	Ht. ap. in n. l.; syst. ap. mur. throughout	Aug., 1885.—Ht. ap. just inside n. l.; syst. ap. mur. on exertion	—
73	Eleanor W., 13, March, 1885	Typhoid f.; bronchitis	F. and M. died phthisis; 3 B. and S. delicate	Ht. ap. ½ in. outside n. l.; no mur.	—	—
74	James S., 16, April, 1885	Always very strong	All strong	Ht. ap. in n.l.; 1st sound murmurish; later a soft mur. at all orifices	March, 1888.—Quite well ever since; ht. natural; very strong looking	—
75	Amelia H., 13, May, 1885	Always pale and delicate; jaundice more than once; dainty	All strong	Ht. ap. just outside in 4th space; no mur.; pulse irregular	—	—

76	Amelia B., 7, May, 1885	No illness; always sick headaches; can't eat rich food	All strong	Ht. ap. inside n. l.; an inconstant syst. mur.	—	In for an examination at time of onset, but does not seem to have worried.
77	John W., 11, June, 1885	No illness; not strong; headaches after studying hard	F. rh. f.; 1 B. rh. f.; M. and 4 B. and S. strong	Ht. ap. at first in n. l.; retreated to natural; no mur.	No regular attack of ch. since, but subject to choreic movements on any worry or emotion, especially in right arm, so that he often cannot write properly; no rh.; ht. ap. in n. l.; imp. not +; 2nd sound not +; no mur.	—
78	Florence A., 13, June, 1887	No illness; always delicate	F. ? M. died phthisis; 2 B. and S. strong	Ht. ap. in n. l.; 1st sound indistinct; a faint syst. mur. developed, only audible when lying	Nov., 1887.—Ht. ap. in n. l.; 1st sound indistinct; on lying down a distinct syst. mur., loudest at ap., not heard behind	—
79	Beatrice W., 10, Sept., 1887	Measles thrice; pertussis twice; always delicate	No rh. or ch. in family	Ht. ap. ½ in. outside n. l.; 1st sound indistinct, though no mur.; 2nd sound + at left base	—	—
80	Mary G., 7, Oct., 1885	Measles; bronchitis; tonsillitis	M. and F. very strong; only a baby S.	Ht. ap. in n. l.; clear syst. ap. mur. heard behind	—	—

(For report of the discussion on this paper, see 'Proceedings of the Royal Medical and Chirurgical Society,' Third Series, vol. i, p. 48.)

ON THE

RELATION OF CHOREA TO RHEUMATISM,

WITH

OBSERVATIONS OF EIGHTY CASES OF CHOREA.

BY

ARCHIBALD E. GARROD, M.A., M.D.

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So much has already been written upon the relation of chorea to rheumatism, that I feel that some apology is needed for adding yet another paper to the list of contributions to the subject. I would plead as my excuse that the question is as yet far from being settled, and that widely divergent views are still held regarding it.

My conclusions are based upon a series of eighty consecutive cases of chorea, which have recently come under my own observation, among hospital out-patients. I had opportunities of observing the milder cases for weeks or months while the more severe ones were seen only once or twice.

Sixty-one patients were females, and only nineteen males. Forty-nine were suffering from their first attacks of chorea, the remainder had had one or more previous attacks.

The ages of the male patients were as follows:

Ages.	First attacks.	Later attacks.	Ages.	First attacks.	Later attacks.
4 years	1	0	11 years	1	0
7 „	1	0	12 „	1	1
8 „	4	0	13 „	1	1
9 „	2	0	14 „	0	1
10 „	1	2	15 „	0	1

Of the females:

Ages.	First attacks.	Later attacks.	Ages.	First attacks	Later attacks.
5 years	1	0	14 years	2	0
7 „	4	0	15 „	1	4
8 „	4	0	16 „	4	2
9 „	5	1	17 „	1	3
10 „	2	0	18 „	1	1
11 „	4	4	20 „	0	1
12 „	1	4	21 „	0	1
13 „	6	2	22 „	1	1

It will be seen from the above Tables that the female cases tend to occur at a considerably later age than the male.

The first point to be noticed, in considering the relation of chorea to rheumatism, is the frequency with which the disease occurs in members of rheumatic families. Amongst my patients there was a history of rheumatic fever in the near relations of twenty-five, of rheumatism with swollen joints in three instances, and in three others of rheumatism only. If we admit all these, we have a total of thirty-one, or 38·8 per cent., who came of rheumatic families. In connection with these figures two points must be borne in mind, namely, the uncertain value of information supplied by patients or their parents, and the frequency with which rheumatic histories are met with amongst patients of all kinds. The error dependent upon the first of these causes must remain an unknown quantity, but it is possible to form some notion of the frequency of rheumatic family histories in non-rheumatic cases.

With the assistance of Dr. Hunt Cooke I obtained the

family histories of 500 patients who applied for relief for a variety of ailments standing in no recognised relation to rheumatism, and we found family histories of rheumatic fever in 21 per cent., whilst amongst those who had themselves suffered from rheumatism the percentage was much the same as that obtained from these chorea cases.[1] The tendency to chorea is much more marked in some rheumatic families than in others, and while we obtain a history of this complication in a large number of the members of one family, in another, in which rheumatism is equally prevalent, no single case of chorea will be known to have occurred.

Thus, the following account is given by the mother of a boy who had himself had three attacks of rheumatic fever, each followed by chorea, and who was at the time suffering from his fourth attack of chorea:

Her mother and five brothers were all rheumatic, and the children of one brother had had chorea. Her sister had had rheumatic fever, and the sister's child chorea. Of the patient's brothers, one had had chorea alone, and another rheumatic fever with chorea. Moreover, the patient's father had suffered from several attacks of rheumatic fever, but no case of chorea was known to have occurred in his family.

Another patient, who was rheumatic, but had never had chorea, gave the following history:

Her father had suffered from rheumatic fever. Her eldest brother had himself escaped, but one of his daughters was rheumatic, and two others had had chorea. Her eldest sister had had three attacks of rheumatic fever, and, of her children, one son had suffered from rheumatic fever, one daughter from rheumatism and chorea, and another daughter died of chorea. The other members of her family were all more or less rheumatic.

In seventeen out of the eighty cases there was, in addition to a rheumatic family history, a fairly definite personal history of articular rheumatism; and the total number of

[1] 'Lancet,' 1888, ii, p. 110.

cases in which there was a personal history of rheumatic manifestations other than endocarditis was thirty-six, or 45 per cent.

Fifteen of these patients gave a definite history of an attack of rheumatic fever, nine of rheumatism with swollen joints, one of joint-pains confining her to bed, and nine of joint-pains only. One patient had rheumatic nodules without arthritis, and one came under observation with acute pericarditis.

It is, of course, open to question whether mere joint-pains can safely be ranked as manifestations of rheumatism, but I believe that they may be for the following reasons:

Chorea usually occurs in childhood, at which period the arthritis of rheumatism is apt to be extremely slight, and members of rheumatic families of all ages are very liable to such joint-pains after exposure to damp or cold. Moreover, the same patient may suffer at one time from chorea associated with simple articular pains, at another from chorea with well-marked rheumatic fever.

The proportion of rheumatic cases which my Tables show is higher than that given by most observers, but it agrees very well with Dr. Stephen Mackenzie's estimate of 44·76 per cent.

There remain thirty cases in which there was neither family nor personal history of articular rheumatism, but I would contend that a considerable number of these were really rheumatic in their origin, and in support of this contention will quote a few individual cases.

In the first place we meet with rheumatic patients who have suffered at an early period from chorea, which in the absence, at the time of the attack, of any personal history of joint affection, as well as of family history of rheumatism, would have been undoubtedly classified as non-rheumatic. For example, a young woman, no member of whose family was known to have suffered from rheumatism, was attacked with rheumatic fever at the age of twenty-three, and it is a remarkable fact that she alone, of all her

family, had suffered from chorea fifteen years previously. This may of course have been a mere coincidence, but other evidence is more convincing.

A. H—, a girl æt. 13, with no family history of rheumatism, had suffered, when she was ten years old, from chorea following a fright. At that time she had never had any articular pains, but when she came under my care three years later she was suffering from subacute rheumatism, with severe heart disease and an abundant crop of typical rheumatic nodules.

Again, I may quote the instance of a girl, æt. 13, who came to the hospital suffering from a first attack of chorea. There was neither family nor personal history of rheumatism, nor was there any cardiac murmur, but when she had been under observation a few weeks she developed erythema nodosum, and some of her joints became swollen and painful.

Whatever view may be held as to the nature of the arthritis so frequently associated with erythema nodosum, it must be admitted that the association in the same patient of two morbid conditions so frequently met with in connection with acute rheumatism, affords powerful evidence of the rheumatic nature of the case.

The following case supplies evidence of another kind:

M. A. W—, a little girl, æt. 8, who had no family history of rheumatism, and who was not known to have ever had any joint-pains, came to the hospital suffering from chorea, and having a loud systolic apex murmur, clearly heard behind. This child was found to have a few rheumatic nodules, and others developed under observation.

This case suggests a curious question, namely, What is the diagnostic value of such nodules? Their frequent association with endocarditis, which suggested to Drs. Barlow and Warner the idea that they are homologous with cardiac vegetations, suggests also that it is possible that any condition which is capable of giving rise to endocarditis might also lead to the formation of such subcutaneous nodules. If this is the case, whatever be the nature

of the endocarditis of chorea, such nodules might be present without in any way implying the presence of the rheumatic taint, but on the other hand there is much evidence tending to show that they are always of rheumatic origin.

The association in one case of acute pericarditis with chorea in a child who showed no other indication of the rheumatic tendency appears to me to lend additional support to the contention that the absence of family and personal history of articular rheumatism must not be taken as any certain indication of the non-rheumatic character of a case of chorea.

I find in my Tables fifteen cases in which the onset of chorea was attributed to a fright, in four others it followed a fall, in one overwork at school, and in another a beating.

One boy had had two attacks of chorea, each of which came on about a month after his sister was similarly attacked, and this is the only instance in which there was evidence of the propagation of the disease by imitation. The brother and sister were under observation for many weeks, and in neither was any abnormal quality of the heart-sounds ever detected.

In inquiring for histories of fright it must be borne in mind that sufferers from chorea are particularly liable to emotional disturbances of any kind, and careful inquiry will sometimes show that a fright followed the onset of the chorea by some hours or even days ; moreover, chorea is often so slight in its early stages that it must frequently be overlooked, and a slight twitching of the face, which is so often the first warning of its approach, may frequently have been present for some time unobserved.

There are instances in which an attack of chorea, clearly of rheumatic origin, is attributed, apparently with justice, to a fright, but such histories are certainly more frequently met with amongst the apparently non-rheumatic cases. There is one curious case in the Tables in which a fright from a fire was followed by pains in the

joints, and three months later by chorea. In this case, as far as I can remember, there was no exposure at the time to which the onset of the joint affection could be attributed.

Hitherto I have confined myself almost entirely to the association of arthritis with chorea, but as chorea is essentially a disease of childhood, the period of life in which rheumatism is least apt to attack the joints and most liable to attack the membranes of the heart, we must be prepared to face the more difficult problem presented by the cardiac affection, which is so frequently present in chorea that it must be regarded as almost a part of the disease.

The heart is apt to be affected in several different manners. In a large number of cases there is evidence that its walls have become dilated, and were it not for post-mortem evidence, which shows how constantly beading of the valves is present, one would be led to attribute the murmurs heard in many instances to the dilatation of the mitral orifice. Irregularity of action is very common, and in a few cases a murmur is heard for two or three successive beats, whilst in the intervals the sounds are natural.

In the great majority of instances the murmurs met with in chorea are apical and systolic, but amongst the cases with personal histories of arthritis, presystolic and double murmurs are not infrequently present.

The following Table shows the distribution of murmurs among the different class of patients:

	Presystolic murmurs only.	Double mitral murmurs.	Systolic apex murmurs heard in the axilla or behind.	Systolic apex murmurs not noted as heard in axilla.	First sound murmurish at apex.	Total.	Percentage.
Cases with personal histories of rheumatic manifestations other than endocarditis, 35 in number	0	3	22	0	2	27	77·1
Cases with family histories of rheumatism, but without personal history, 15 in number .	0	0	3	0	1	4	26·6
Cases with neither family nor personal histories of rheumatism, 30 in number . . .	1	0	14	2	3	20	66·6
Total . . .	1	3	39	2	6	51	—

It will be seen that a definite murmur was heard in forty-five cases, or 56·25 per cent., whilst in six others the first sound was murmurish at the apex.

As might be expected, the percentage of murmurs was highest amongst those who had exhibited rheumatic manifestations, but it was lowest amongst those who had family but no personal rheumatic histories, a class of cases in which we should expect the endocarditis to be fairly frequent, if it is rheumatic in its origin.

The absence of any murmur in twenty-nine cases is hardly consistent with the view that the chorea is merely a sequela of endocarditis, as the embolic theory demands; for although it has been shown post mortem that endocarditis is almost invariably present in fatal cases, even when no murmur has been heard during life, we must remember how severe these fatal cases are, and it is hardly to be imagined that endocardial lesions can be present in those patients in which the heart sounds were found to be natural week after week. Moreover, in some instances the endo-

carditis is clearly progressive, murmurs developing under observation.

Of my eighty patients no less than seven developed systolic apex murmurs, apparently organic, which remained constant as long as they were under observation, and in two others a murmur developed, and after a time disappeared. In one instance a patient who had a systolic mitral murmur only when first seen, developed a presystolic murmur, but she had quite recently suffered from rheumatic fever.

The fact that more than half the cases with murmurs had rheumatic personal histories seems to point to rheumatism as the commonest cause of the endocarditis of chorea, and since rheumatism is by far the commonest cause of endocarditis, it is but a slight step further to conclude that this lesion, which is so frequently met with in two such closely associated diseases as rheumatism and chorea, has a common origin in both; in a word, that the endocarditis met with in connection with chorea is always rheumatic.

We have already seen that the absence of family history of rheumatism, as well as of personal history of arthritis, must not be regarded as showing conclusively that an attack of chorea is not rheumatic, and this, coupled with the generally admitted fact that in children endocarditis is often the sole manifestation of rheumatism, appears to me to lend powerful support to this view.

On the other hand, it must be admitted that one or two points, brought out by the statistics, seem to point in the other direction.

In the first place, the histories of emotional causes reach their highest percentage in those cases in which there is no history of joint-pains, but in which murmurs were heard; and, secondly, there is the fact, to which attention has already been called, that the percentage of murmurs is lowest in those cases in which there were only family histories of rheumatism. To the first of these objections it may be replied that rheumatic chorea

may have a fright as its immediate cause, while the second loses some of its force from the small number of the cases of this kind.

I fear that to many the conclusion, that the endocarditis of chorea is always rheumatic, will appear overbold, but until some better explanation of the association of progressive inflammation of the endocardium with a nervous disease such as chorea can be advanced, to me at least this view appears to agree best with what is known of the pathology of these conditions.

If we go so far as to make this admission, are we justified in going yet a step further, and declaring, as Botrel did, that all chorea is simply a manifestation of rheumatism?

I think that in the present state of our knowledge we are not justified in arriving at such a conclusion. Even if we grant that there are cases of rheumatic chorea in which even endocarditis is absent, there will still remain a residue, which must be attributed to the action of other causes until we can obtain some evidence, which we do not as yet possess, of their rheumatic nature, and such evidence we are not likely to have until we know far more than we do at present of the pathology of rheumatism itself; until, indeed, we can discriminate between conditions which are and conditions which are not rheumatic, by the presence in, or absence from, the blood and tissues of the still unknown poison of rheumatism.

TABLE *showing the relation in time of the chorea to the joint affection.*

A. *Cases in which there had been previous attacks of chorea.*

Sex and age.	First attack of chorea.	Second attack of chorea.	Third attack of chorea.	Fourth attack of chorea.
M. 12	Followed rheumatic fever	Followed rheumatic fever	Followed rheumatic fever	Without joint affection.
F. 15	Accompanied subacute rheumatism	Accompanied subacute rheumatism	Without joint affection	—
F. 15	Accompanied by joint-pains	Accompanied by joint-pains	Followed rheumatic fever	—
F. 20	Six months after rheumatic fever	Without joint affection	—	—
F. 17	Preceded joint-pains	Followed subacute rheumatism	—	—
F. 11	Preceded rheumatic fever by eight months	Without joint affection	—	—
M. 10	Preceded the second attack of rheumatic fever	Preceded subacute rheumatism	—	—
F. 17	Preceded subacute rheumatism	Preceded subacute rheumatism	—	—
F. 18	Accompanied subacute rheumatism	Accompanied joint-pains	—	—
F. 13	Followed second attack of rheumatic fever	Followed third attack of rheumatic fever	—	—

B. *Cases observed during the first attack of chorea.*

The chorea preceded—
- Rheumatic fever in . . . 0
- Subacute rheumatism in . . 1
- Joint-pains in 8

Chorea followed immediately upon—
- Rheumatic fever in . . 8
- Subacute rheumatism in . . 8
- Joint-pains in 8

Chorea followed within six months of—
- Rheumatic fever in . . . 0
- Subacute rheumatism in . . 2
- Joint-pains in 1

Chorea followed within a year of—
- Rheumatic fever in . . . 8
- Subacute rheumatism in . . 0
- Joint-pains in 0

In the remaining six cases the exact time relation of the chorea to the joint affection could not be determined.

TABLE.

No.	Sex and age.	Family history.	Personal history.	Condition of heart.	Remarks.
1	M., 20	Mother had rheumatic fever	Rheumatic fever in Sept., 1886. Left-sided chorea Feb., 1887. July, 1887, return of chorea	Mitral presystolic and systolic murmur	—
2	S. A., F., 12	Mother rheumatic fever twice; attended with patient for remains of rheumatic fever	Rheumatic fever twice, 7 and 2 years ago. Chorea 4 years on and off; worse again 4 months	The heart's apex was low in the nipple line; there were signs of mitral regurgitation, but the murmur was not heard 7 months later	Fair child.
3	M. W., F., 9	Mother has had several slight attacks of rheumatic fever	Patient has had rheumatism, with swollen joints of hands, feet, knees for 2 months; in bed 2 or 3 days. Right hemichorea 2 days	The apex was in the nipple line, but there was no murmur heard. The case was under observation nearly 3 months	Fair, plump child. Recovery from chorea in 10 weeks. No fright.
4	E. F., F., 7	Mother rheumatism; was in bed a fortnight with swollen joints	Pains in joints 6 or 7 weeks ago; in bed a week; sweated much; pain very great in knees and back. Since then left chorea	The apex was in the nipple line; there was a systolic apex murmur, heard behind, constant during 2 months	Red hair; well nourished. No fright.
5	W. H., M., 10	Mother rheumatic fever 3 years ago	Rheumatic fever at the same time as his mother; often has joint-pains in wet weather. Chorea (left) on and off for 3 years, since rheumatic fever	A systolic apex murmur, heard in the axilla, developed under observation	Fair; poorly nourished.
6	W. F., M., 12	Mother's mother and her five brothers all rheumatic; the children of one had chorea. Mother's sister rheumatic fever; her child had chorea. Father rheumatic fever several times. One brother chorea; one brother rheumatic fever, chorea, and morbus cordis	Rheumatic fever 5 years ago, with bad chorea (right); again 4 years ago, with slight right chorea; again 6 months ago, with slight right chorea. Chorea a fortnight; right side again worse	The heart's apex was in the nipple line, and a systolic murmur, well heard in the axilla, was constant while the patient remained under observation	Fair; well nourished.

7	E. M., F., 7	Father and mother rheumatic fever in childhood	Paints in joints and sore-throat about 5 months ago; no rash. Now has joint-pains, especially on right side. Swelling of ankle last week. Chorea 9 days	Apex just inside nipple line; systolic apex murmur heard in axilla	Thin, dark. No fright.
8	J. G., F., 18	Father rheumatic fever. One brother rheumatism in knee	Was in an infirmary 7 weeks about 4 months ago with rheumatism; joints swollen. Chorea (left) 9 days. (Rheumatic fever)	Apex half an inch outside nipple line; systolic apex murmur, heard in axilla (constant)	Brown hair; well nourished.
9	E. D., F., 15	Mother rheumatic fever three times	Often swelling of knees during the last 4 years. Chorea when knees were first bad. Badly 5 months ago; some return now	Apex displaced outwards; systolic apex murmur, heard in the axilla	Thin, dark. Doubtful history of fright.
10	E. B., F., 17	Father and mother rheumatic. One sister rheumatic fever and chorea; one sister chorea; three other sisters rheumatic	Chorea about a year ago, followed by pains in the joints; pain and swelling of joints of fingers 3 weeks; chorea 3 weeks	Systolic apex murmur; pulmonary second sound intensified; murmur heard behind	Fair; well nourished.
11	A. R., F., 11	One brother rheumatic fever, followed by chorea	Never rheumatic fever. Pain in left hand and wrist; some tenderness and swelling. Chorea 5 weeks, worse on left side	Apex in nipple line; no murmur	Brown hair; well nourished.
12	W. E., M., 9	Mother rheumatic fever. One sister chorea (No. 31 in Tables)	Rheumatic fever in Aug., 1887. Chorea in April, 1888	This patient developed a systolic apex murmur (which remained) under observation	Well nourished. No fright.
13	E. F., F., 14	Mother's father rheumatic fever two or three times. Mother rheumatic	Rheumatic fever, summer of 1887. Chorea in April, 1888; chiefly left side	Apex displaced outwards; a systolic apex murmur, heard in the axilla, developed under observation	Fair; well nourished.
14	J. C., F., 22	Father rheumatic fever. One sister rheumatic fever and chorea; another sister chorea	Married, two children, not pregnant. Never chorea before. Rheumatic fever in summer of 1887. Chorea, chiefly of left side, since March, 1888 (3 months)	The apex was just outside the nipple line, but no murmur was heard, standing or lying (2 observations)	Dark; fairly nourished. No fright.
15	M., 21	No family history of rheumatism. Father had "rheumatic gout"	Never rheumatic fever. Chorea 5 years ago. Joint-pains ever since; when these were relieved the chorea returned slightly	First sound murmurish at apex	Fair; well nourished.
16	F., 11	No rheumatic family history	Chorea in Jan., 1887. Rheumatic fever in Aug., 1887. Chorea Oct., 1887	Mitral systolic murmur	—

No.	Sex and age.	Family history.	Personal history.	Condition of heart.	Remarks.
17	R. S., F., 13	No rheumatic family history	Never rheumatic fever. Scarlatina 3 years ago (no joint trouble). Chorea 14 days (right side). Swelling and pain in right ankle on Jan. 3rd, 1888, with erythema nodosum (one month after appearance of chorea)	Heart's action irregular; no murmur	No fright.
18	C. K., M., 10	No family history of rheumatism nor chorea	Rheumatic fever 6 years ago; again 4 years ago, immediately preceded by chorea. Slight chorea a fortnight; return of rheumatism 4 days	Presystolic thrill and double apex murmur	Fair; well nourished.
19	W. D., M., 8	No family history of rheumatism nor chorea	Rheumatic fever one month ago. Chorea 3 days (left side chiefly)	Slight systolic apex murmur heard behind (?) (3 observations)	Fair; well nourished.
20	C. H., F., 14	No rheumatic family history	Fright (from a fire), followed by pains in joints, especially in hands. Chorea 3 months later, chiefly right	A double murmur was heard at the apex; 2 months later a systolic murmur only was heard	Dark, thin.
21	A. B., F., 16	No rheumatic family history	Rheumatic fever in Jan., 1888. Chorea began during convalescence	A systolic murmur, which sometimes had a musical character, was heard at the apex; and a presystolic thrill and murmur developed under observation	Dark, thin.
22	F. H., F., 15	No family history of rheumatism nor chorea	Rheumatism in Oct., 1887; swelling and pains in joints; in bed some days. Chorea in Jan., 1888	Soft systolic apex murmur, not clearly heard behind	Fair; well nourished. No fright.
23	S. M., F., 15	No rheumatic family history	Rheumatic fever twice. Chorea during convalescence from second attack; 4 years on and off; worse on right side	Apex in nipple line; a soft systolic murmur, which was not clearly heard behind. Known to have had a murmur 2 years previously	Fright. Brown hair, thin.
24	R. R., F., 17	No rheumatic family history	Swollen joints 2½ years ago; in bed a fortnight. Chorea about a fortnight before the joints became bad. Right knee hot and swollen; pain in shoulders and left elbow. Chorea again 4 months	A systolic apex murmur developed under observation, simultaneously with one or two rheumatic nodules; murmur heard in axilla; the murmur disappeared later	Fair; well nourished. Fright from a fire a month or so before the first attack.

25	E. D., F., 18	Mother's mother rheumatic fever	Chorea, with joint-pains and swelling, 18 months ago; worse on left side. Chorea again 3 weeks. Complains of pain in left hand	Apex outside nipple line; systolic apex murmur heard in axilla	Brown hair; well nourished. No fright.
26	S. M., F., 15	No rheumatic family history	Chorea at 10, with joint-pains; again at 12, with joint-pains. In May, 1888, rheumatic fever (in bed a fortnight), followed by chorea; worse on right side. Still subacute rheumatism	Apex outside nipple line; systolic apex murmur, heard in the axilla	No fright.
27	M. A. W., F., 8	Mother's sister chorea. No rheumatic family history	Never joint-pains nor swollen joints. Chorea began in May, 1888; successive developments of rheumatic nodules occurred under observation	Constant, loud systolic apex murmur; apex outside nipple line	Brown hair; fairly nourished. No fright.
28	E. M., F., 13	No rheumatic family history	Rheumatic fever three times; second attack followed by chorea; third at Easter time, 1888. Chorea followed some weeks after	Apex outside nipple line; systolic apex murmur, heard in axilla	Fair; poorly nourished.
29	F., 5	Father and mother rheumatic fever. One cousin chorea	Never any joint affection	No murmur	—
30	G. C., F., 17	Brother died of rheumatic fever. Aunt chorea	Chorea 6 months ago; slight return, with loss of power in left side	No murmur	Fair; well nourished. History of fright.
31	T. E., F., 13	Mother and brother rheumatic fever	Never rheumatism, nor joint-pains. Chorea one week. Tonsillitis	Action irregular; a systolic apex murmur appeared, disappeared, and reappeared under observation	Fright. Dark; well nourished.
32	A. H., F., 11	Father and mother rheumatic fever	Pain in joints about a month; no swelling. Chorea one month; also 4 years ago	Systolic apex murmur, heard in axilla, developed under observation	Fright.
33	W. G., M., 10	Mother rheumatic fever many times	Never rheumatism. Chorea (right) one month	Action irregular; some displacement of apex; no murmur	No fright. Fair; well nourished.
34	G. K., M., 12	One sister rheumatism; laid up two weeks; joints swollen	Never rheumatism. Pains in left side. Left chorea a few days	Heart natural	Fair.
35	G. W., M., 9	Father rheumatism; several attacks	Never rheumatism nor joint-pains. Chorea on Dec. 15th, 1887. Fright on Dec. 16th	No murmur	—

No.	Sex and age.	Family history.	Personal history.	Condition of heart.	Remarks.
36	S. P., F., 9	Mother rheumatism. Chorea in children of father's sister	Never rheumatism. Pains in knees a week; no swelling. Chorea about a fortnight. Doubtful history of erythema marginatum	No murmur	Dark; well nourished.
37	H. W., F., 17	Mother rheumatic fever; heart affected	Never rheumatism. Chorea 3 or 4 months. Catamenia ceased at the same time. Right hemichorea	First sound murmurish at apex	Brown hair; well nourished.
38	C. G., F., 13	Mother rheumatic fever	Never rheumatism, nor joint-pains. Right chorea two months	Irregular action; soft systolic murmur heard in axilla	No fright.
39	C. R., F., 13	Mother rheumatic. One brother chorea	Never rheumatism. Pains in joints of arms 2 years ago; no swelling. Two previous attacks of chorea. Two months now; right side chiefly	Apex just inside nipple line; no murmur	Fair; well nourished. No fright.
40	A. W., F., 12	One sister rheumatic fever	Chorea 6 years ago; traces since; worse lately	Irregular action; no murmur; apex in middle line	Fair; well nourished.
41	S. G., F., 12	Mother rheumatic fever	Never rheumatism, nor joint pains. Chorea began 5 weeks ago, 2 or 3 days after a fall	The first sound became murmurish under observation; apex outside nipple line	Well nourished. History of fall.
42	E. F., F., 13	Mother rheumatic fever	Never rheumatism. Chorea 5 weeks (right), followed one day after a fall. Growing pains in elbow a few months ago	A systolic murmur, thought to be hæmic, disappeared under observation	Brown hair; well nourished. History of fall.
43	E. B., F., 12	Mother rheumatic fever three times; no morbus cordis. Father rheumatic	Never joint-pains, nor swollen joints. Chorea 5 or 6 weeks once or twice before; chiefly left-sided	Apex outside nipple line; action irregular; systolic apex murmur, heard in axilla	Fair; well nourished. Was run over just before first attack.
44	M. S., F., 11	Father suffers from rheumatism; has swollen joints; is laid up a month at a time	No history of joint affection. Chorea on and off for 7 years	Apex in nipple line; first sound murmurish	Fair; well nourished.
45	A. E., F., 7½	No family history of rheumatism	No history of joint affection. Chorea began a day after a scolding at school	On the second day of the chorea the apex was in the natural place; a loud harsh systolic murmur was heard at the apex and behind; action irregular	Dark, thin.

	F., 21	No rheumatic family history	No history of joint affection. Chorea 4 years ago and now	First sound murmurish at apex	Pregnant, 3rd month.
47	M., 15	No rheumatic family history	No history of joint affection. Chorea at 6, 12, and 15	Systolic apex murmur	—
48	M., 14	No rheumatic family history	Choreic movements since he was 10; 9 attacks; occasionally free 3 or 4 months; confined to left side	No murmur	Ascribed to overwork at school.
49	F. R., F., 8	No rheumatic family history	No history of joint affection. Headache nearly a year. Chorea 3 weeks	No murmur	—
50	H. J., F., 9	One brother chorea simultaneously with each of the patient's attacks	No history of joint affection. Chorea in Oct., 1886, and Dec., 1887	Under observation several months; no murmur was ever heard	Knock on head a year ago. Fair; well nourished.
51	W. J., M., 13	Brother of last patient	Never joint affection. Chorea last year one month after his sister. Present attack began 3 weeks ago, also after sister had suffered from chorea about a month	Under observation several months; no murmur was ever heard	Fair; well nourished.
52	A. E., F., 10	No rheumatic family history	Never any joint affection. Chorea, first attack	Heart natural	Brown hair; well nourished.
53	F. C., F., 11	No rheumatic family history	Never any joint affection. Chorea 3 weeks	Heart natural	Fair; well nourished. History of fright at school, just before the chorea.
54	J. B., M., 11	No rheumatic family history	No rheumatic history. Scarlatina, Sept., 1884. Chorea, May, 1885	Apex depressed and in nipple line; loud systolic apex murmur heard in the axilla	Fair, thin.
55	L. S., F., 13	No rheumatic family history	Severe chorea, one month, following fright. Never any joint affection	Soft systolic apex murmur	History of fright. Dark, thin.
56	E. W., F., 11	No rheumatic family history	Chorea 3 months. Never any joint affection	Developed a soft systolic apex murmur under observation	Red hair; well nourished.
57	S. P., F., 8	No rheumatic family history	Complained of pain in knee last night (Jan. 18th, 1888). Chorea began on Jan. 14th, right-sided	Systolic apex murmur well heard behind; apex in nipple line	Fair; well nourished.
58	E. G., F., 16	No rheumatic family history	Some joint-pains, with chorea; pain all over left side. Slight left chorea 3 weeks	Apex in nipple line; soft systolic apex murmur heard in axilla	Attributed to overwork.
59	M. W., F., 9	Father rheumatic gout	Chorea 2 months. Never any joint affection	Systolic apex murmur	Fair, thin. History of fright.

No.	Sex and age.	Family history.	Personal history.	Condition of heart.	Remarks.
60	G. B., M., 8	No rheumatic family history	Never any joint affection. Chorea 4 months; worse 3 weeks; left	The apex was displaced outwards; a systolic apex murmur developed and disappeared; it was heard in the axilla	Fair; well nourished.
61	E. S., F., 11	No family history of rheumatism, nor chorea	Never any joint affection. Chorea, first attack "long ago." Present attack (the third) has lasted 3 months	A systolic apex murmur developed a month after she came under observation, and remained	Dark, thin.
62	J. H., M., 13	No family history of rheutism, nor chorea	Never any joint affection. Slight chorea about 12 months; right side chiefly	Heart natural	Fair; well nourished.
63	J. C., M., 8	No family history of rheumatism, nor chorea	Never any joint affection. Chorea 6 weeks	No murmur; apex displaced outwards	Brown hair; fairly nourished.
64	G. W., M., 4	No family history of rheumatism, nor chorea	Never any joint affection. Fit 3 months ago; unconscious 3 hours; vomited some blood. Since then chorea	Heart natural	Fair; well nourished.
65	M. D., F., 9	No family history of rheumatism, nor chorea	Always delicate. Never any joint affection. Chorea a fortnight	Apex displaced outwards; no murmur	Fair, thin.
66	C. S., F., 22	No family history of rheumatism, nor chorea	Never any joint affection. Chorea at 7 and 9. Chorea 2 months; left side worse	Apex displaced; presystolic apex murmur	Pregnant 4 months.
67	L. G., F., 12	No family history of rheumatism, nor chorea	Never any joint affection. Pain in right arm. Chorea Nov., 1883, following overwork at school. Nearly run over 3 weeks ago; chorea soon after	Under observation 2 months; always a systolic apex murmur, heard in the axilla; apex in nipple line	Dark; well nourished. History of fright.
68	E. O., M., 7	No family history of rheumatism, nor chorea	Never any joint affection. Beating at school 6 weeks ago. Chorea a few days after; right side worse; some loss of power	Irregular; apex displaced outwards; no murmur	Brown hair; well nourished. Followed beating.
69	E. G., F., 15	No family history of rheumatism; one sister chorea	Never any joint affection. Chorea after a fright 7 years ago; many attacks since	A systolic murmur, heard behind, was sometimes noted; not always heard	Fair; well nourished. History of fright.
70	W. K., M., 8	One sister chorea	Never any joint affection. Slight chorea one month	Heart natural	Brown hair; well nourished.

	F., 10	tory, no chorea	9 months; right side worse. Tonsillitis	tolic apex murmur heard behind, gradually diminished and disappeared under observation	—
72	E. H., F., 9	No rheumatic family history, no chorea	Never any joint affection. Slight chorea a fortnight	Apex outside nipple line; a systolic murmur heard occasionally for several successive beats	—
73	K. G., F., 7	No rheumatic family history, no chorea	Chorea, worse on right side, 2 months. Never any joint affection	Heart natural	Fair; well nourished. Fright 3 months ago.
74	A. S., F., 16	No rheumatic family history, no chorea	Never any joint affection. Chorea when catamenia began, a year ago; again 8 weeks ago; catamenia then missed. Pains in face, hand, and arm, not in joints	Apex inside nipple line; systolic apex murmur, heard in axilla	Brown hair; well nourished. Severe fright just before first chorea.
75	E. R., F., 16	No rheumatic family history, no chorea	Never any joint affection. Pains up arms. Chorea 3 or 4 weeks	Heart natural	Followed fright from a dog. Fair; poorly nourished.
76	J. M., F., 16	No rheumatic family history, no chorea	Pains in arms (not joints) since chorea began. Chorea a fortnight; worse on right side	Soft systolic apex murmur heard behind	Brown hair; fairly nourished.
77	M. T., F., 11	No rheumatic family history, no chorea	Never any joint affection. Chorea a fortnight	A systolic murmur was occasionally heard, for a few beats, at the apex, and in the axilla; best lying down	Brown hair; well nourished.
78	E. E., F., 16	No family history of rheumatism, nor chorea	Sometimes some joint-pains. Never rheumatic fever. Chorea in spring of 1886, after a fall; again in Nov., 1886; slightly again in June, 1888; chiefly left side	Apex beat feeble, inside nipple line; no murmur	Brown hair; well nourished. First attack followed a fall.
79	E. K., F., 8	No family history of rheumatism, nor chorea	Never any joint affection. Chorea followed a fall (a week after); no nodules	Signs of acute pericarditis; loud double friction; musical systolic murmur at apex	Fair; well nourished. Attributed to a fall.
80	J. L., F., 13	No family history of rheumatism, nor chorea	Never any articular affection. Chorea a month or two; chiefly left side	Heart natural	Fair, fat.

(For report of the discussion on this paper, see 'Proceedings of the Royal Medical and Chirurgical Society,' Third Series, vol. i, p. 48.)

BACK-KNEE, KNOCK-KNEE, BOW-KNEE

AND

OTHER DEFORMITIES RESULTING FROM DEFECT OF GROWTH AT THE EPIPHYSIAL LINES.

BY

GEORGE MURRAY HUMPHRY, M.D., F.R.S.,
PROFESSOR OF SURGERY IN THE UNIVERSITY OF CAMBRIDGE.

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In a paper "On the Influence of Paralysis and other morbid conditions upon the Growth of the Bones," published in vol. xlv of the 'Medico-Chirurgical Transactions,' 1862, p. 293, I gave a brief account, with a drawing, plate vii, fig. 1, of the leg of a girl, æt. 15, in which there was a marked backward curvature of the right tibia near the knee. It was said to have taken place during the six months preceding the date of my seeing her; and it remained in the same condition when I again saw her three years afterwards. The right tibia was shorter than the left; but the fibula had its proper length and rose above the level of the upper end of the tibia. I attributed the deformity to a want of proper growth at the fore part of the upper epiphysial line of the tibia, the articular part of the bone having, as a consequence,

become inclined forwards. The term "back-knee" seems an appropriate one for the condition.

Last winter my attention was drawn to a limb in the dissecting room so closely resembling the one above mentioned that I should have thought it to be the same had not age of the woman, above seventy, proved that it could not be so. Professor Macalister was good enough to place the limb at my disposal. The drawing (Pl. I, fig. 1), taken from a cast made by Mr. Griffiths, shows the sharp bend backwards of the leg near the knee and the great similarity of the case to that already alluded to; and figs. 2 and 3 show the tibia to be so much bent backwards near the upper end that its articular surface is at an angle of 40° with the shaft. The condyles of the femur, which are natural, are seen to be resting upon this sloping articular surface which is also natural. In the sharply retiring angle in front of the tibia there is a good deal of bone-formation which stands out boldly obscuring the tuber tibiæ. Behind, the outline is more rounded, resembling that of the anterior surface of a natural tibia, though it is more convex; and there is here no bony deposit. The section (fig. 3) shows the anterior wall thickened at the retiring angle, this being the part which corresponds with the line of junction of the epiphysis with the shaft; and the traces of the epiphysial line behind are seen a little below the articular surface and three quarters of an inch above the greatest convexity of the posterior curvature. The tibia is an inch shorter than that of the other limb; and the fibula extends to a little above the level of the topmost hinder border of the tibia. The rest of the tibia is natural, as also is the femur; and the movements of the knee-joint were free.

There can, I think, be little doubt that, as said in the passage quoted from my former paper, the deformity is due to a want of proper growth at the epiphysial line, and more particularly at its fore part, the upper surface of the bone being, in consequence, inclined forwards. The epiphysial line, as indicated by the remaining traces

of it, has acquired a similar slant, its relations to the articular surface being little altered because the growth at this line—and the same holds good with regard to other epiphysial lines—is almost confined to the side next the shaft; and an interference with it would be manifested only or chiefly on the lower, or shaft, side, that is to say, it is the growth of the shaft that would be arrested rather than that of the epiphysis by a suspension of activity in the epiphysial line.

The deformity, of which I have only seen these two examples, and which must have taken place during the growing period—it is stated to have done so in the first case—is, I think, attributable to undue pressure upon the fore part of the epiphysial line occasioned by the weight of the thigh and body falling in a disproportionate and excessive manner and extent upon this part, which may have taken place as follows. In the fully extended position of the knee the joint is bent a little backwards, all the ligaments, more particularly the posterior ligament, the posterior crucial ligament, and the lateral ligaments, which are placed nearer the back than the front of the joint in a plane behind the chief axis of motion, are put on the stretch, limiting further extension and causing a locking of the joint in such a manner that the position can be maintained without muscular effort, and is, accordingly, one of rest. In this position the line of weight falls through the fore part of the condyles of the femur, the *fore* part of the articular surface and epiphysis of the tibia, and the *fore* part of the epiphysial line of the tibia, while the drag upon the ligaments attached to the hinder part of the epiphysis acts still further to the disadvantage of the fore part of the epiphysial line. It thus tends to repress the growth and ossification of the cells in this situation and more or less along the epiphysial line, and the elongation of the shaft which should take place through their medium. Now, the attitude of resting with the whole weight thrown upon one fully extended limb, the other limb being used to preserve

balance, is frequently assumed by some persons. It is the stand-at-ease position of the soldier; and, if habitually maintained during youth, it would be not unlikely to induce the deformity in question. In accordance with this view, the osseous formation in front of the retiring angle may be compared with the bony ridges that form at the bulging edges of the epiphysial lines of the long bones often observed in rickets and also at the edges of the bodies of the vertebræ in lateral curvature of the spine, though it is in excess of what usually takes place in these instances. It is to be remarked that a similar bend, in the same situation but in the opposite direction, that is, with the convexity forwards, sometimes occurs in monkeys, as represented in fig. 4; and the direction of this bend accords with the fact that in the monkey the knees are commonly more or less bent, and the weight consequently falls more upon the hinder parts of the femoral condyles and of the articular part of the tibia and the epiphysial line. Full extension, indeed, of the joint, with the associated direction of weight upon its fore part, can scarcely be said to take place in any animal except man.

In the deformity with an *in*ward bend commonly called "Knock-knee" or "genu valgum" a similar condition may now and then be detected on the *out*er side of the upper end of the tibia; and there is, not unfrequently, a bend in the shaft of the femur or tibia of an obviously rickety nature. The chief and special feature of the deformity, however, is a deficiency in the length of the outer condyle—rather of the outer condyloid part of the shaft—of the femur, and a consequent obliquity of the lower articular surface of the femur, which are the resultant of an imperfect growth at the outer part of the epiphysial line. That this is the correct pathology of genu valgum I maintained as long ago as 1850 in my Lectures on Surgery published in the 'Provincial Medical and Surgical Journal' of that year, p. 91, and in my work on the 'Human Skeleton,' 1858, p. 476; and the view has been amply confirmed by Mikulicz in Langen-

beck's 'Archiv für klin. Chir.,' xxiii, Hefte 3 u. 4, and by Busch in 'Berlin. klin. Wochenschr.,' 1879, No. 38. Fig. 6 represents a femur and tibia, in the Cambridge Museum, in which this stunting of the outer condyle is very marked and there is nodular bony growth at the edge of the epiphysial line on its outer side such as is common near the ends of rickety bones where there has been giving or bulging of the epiphysial lines consequent on their delayed and imperfect ossification. The outline of the inner surface of the inner condyle is too curved; and the adjacent parts of the shafts of the tibia and femur are expanded and flattened out in the direction of the plane of the curve formed at the knee in the manner often seen in rickety bones. I have found similar specimens in certain German museums—Würzburg, Munich, Berlin, and Vienna, which, as well as the Musée Dupuytren in Paris, are rich in specimens of the so-called, but miscalled, "Englische Krankheit."

The frequency of the occurrence of this stunting of the outer condyloid part of the femur, and consequent knock-knee, is due to the fact of its being the weight-bearing portion of the lower end of the bone. A plumb-line falling from the uppermost part of the head of the femur passes through the outer condyle, which is provided for its function by its greater breadth as compared with that of the inner condyle, and by the greater thickness and vertical direction of the cancellous plates in its interior. The provisions, however, are scarcely sufficient to meet the requirements in young growing persons, especially those who are obliged to stand much or to carry burdens. Hence the cell growth and ossifying processes associated therewith are liable to be interfered with at this epiphysial line, where a greater amount of growth takes place than in any other part of the skeleton; and the failure is most likely to be evinced in the outer or more weight-bearing part of the line. The obliquity of the articular surface thus induced causes the slant of the leg outwards and the projection of the knee inwards

in the extended position of the joint; but, forasmuch as the condyle attains its normal antero-posterior diameter, and the full size of its hinder rounded surface, the leg acquires its proper direction with regard to the thigh during the flexion of the knee.

Knock-knee is still commonly attributed to *undue growth* of the *in*ner condyloid part of the femur. The growth here is no doubt out of proportion to that on the outer side because the latter is defective, but there is not any sufficient reason for thinking that it is excessive or abnormally great. An excessive or disproportionate growth at an epiphysis, or at any part of an epiphysis, is very rare. I do not remember to have met with an instance, unless it be now and then on the convex side of the vertebral bodies in lateral curvature of the spine, whereas deficiencies are very common. They are the usual associates of rickets as evidenced by the shortness of the bones in this condition; and the deficiency is, as might be expected, very liable to manifest itself at the lower end of the femur on one or both sides. Illustrations of this, with bulging at the epiphysial line all round, from specimens in the Musée Dupuytren, are given in the plate accompanying my paper in vol. xlv of the 'Transactions' of this Society. I do not think that this view of the pathology of knock-knee—namely, that it depends upon *suppressed growth* in the *out*er condyloid part of the femur—has any especial bearing upon the operation of osteotomy for its relief.

With regard to the opposite deformity viz. "Bow-knee," or "*genu varum*," the only specimens I have seen of shortening of the *in*ner condyloid part of the femur are in two otherwise rickety skeletons in the Museum at Vienna; and in both these there are traces of bulging at the *in*ner part of the epiphysial line. We may sometimes recognise in the living limb, in cases of bow-knee, a slight prominence at this part, and more frequently a more or less distinctly projecting ridge on the *in*ner side of the upper part of the tibia along the epiphysial line,

indicating a want of due growth at this part which would give rise to an obliquity of the upper articular surface of the tibia. In many instances, however, the curvature is not limited to the region of the epiphysial line but is diffused over the upper part of the tibia and in some also over the lower part of the femur. Indeed, the deformity in bow-knee, as well as in knock-knee, is, in some cases, entirely dependent upon curvature in the shafts of the femur and tibia.

Fig. 5 (Pl. I) represents the upper end of an adult humerus, in the Cambridge Museum, in which the head of the humerus is placed at a lower level than natural owing to a sharp flexure at the upper end of the bone, the concavity of which is just beneath the articular surface of the head, and the convexity is on the outer side of the great tuberosity. The bone is in other respects normal. There is a similar flexure in the humerus of the other side, and also in two humeri, in the same museum, from an adult subject, which, together with the scapulæ (they are the only bones from that subject in the museum), are atrophic, being very thin as if from paralysis. These flexures I conceive to be due to an imperfect growth at the inner part of the epiphysial line; but to what cause that imperfection, or stunting, is to be attributed I cannot tell. The same cause must have been in operation on the two sides, and may have been congenital; or it may possibly have been due to the habit of supporting the weight of the body upon the arms during a period of confinement to bed in early life.

The most common examples of inequality of growth at the two sides of the epiphysial lines are furnished by the bodies of the vertebræ in cases of lateral curvature of the spine, which, on the concave sides of the curves, often do not acquire one half of the normal depth; and their upper and lower margins are so projected, or squeezed out, as to cover and sometimes become ankylosed over the intervertebral substances. This occurs most frequently during the later periods of growth, as a consequence of arrest of ossification at the upper and lower

epiphysial lines of the vertebral bodies caused by the weight of the superincumbent parts being thrown unduly upon one side ; and it sometimes goes on to absorption and further modification of form of the vertebral bodies. In the cases indeed which commence in still later life the lessening depth of the vertebral bodies on one side must be entirely due to absorption from pressure. In a few cases I have thought that the bodies of the vertebræ had acquired a slight increase of thickness on the convex side; but this is rarely the case, the deformity being due almost entirely to a deficiency on the concave side. In the infantile curvature backwards the growth or epiphysial ossification is somewhat hindered in front but usually leaves no permanent deformity. In the senile curvature backwards, on the other hand, which usually commences in the dorsal region and involves the lumbar and cervical regions, the bodies of the vertebræ may become absorbed and flattened in front.

While speaking of growth at epiphysial lines—the growth of the cartilage layer and the ossification into it from the shaft—I may remark that the force of growth at these parts is usually sufficient to overcome the resistance offered by the pressure resulting from weight and muscular action and gives to the several bones and the surrounding soft parts, and so to the individual, a determined height; the standard of height being therefore regulated by the amount and endurance of this force of growth and its ability to overcome the resistances offered, which vary in different persons. In rickets, however, this force, more particularly the ossifying element in it, which seems to be its most difficult and most easily disturbed feature, is deficient, and the bones are short. The epiphysial cartilages, though restricted in their growth, are still more restricted in their ossification. Hence they are unduly and irregularly thick, soft, and liable to bulge at the circumference. The deformity thus induced usually disappears as time goes on ; and, commonly as it is observed at the lower end of the radius and at

the junction of the cartilages with the ribs in rickety children, the traces of it become lost and are rarely to be detected at these parts in the bones of rickety adults. They are more frequently found to be persistent at the lower end of the femur and at the upper end of the humerus, those being the parts where epiphysial growth is greatest and most prolonged. The more localised and limited defects in epiphysial growth to which I have particularly referred in this paper as causing the deformities about the knee and the lateral curvature of the spine, though of the same nature as the other manifestations of rickets and often associated with them, usually show themselves somewhat later, during that period of accession of development and growth which is associated with and follows puberty; and they are very liable to be persistent.[1]

[1] In the 'Transactions of the Pathological Society,' vol. xxiv, p. 179, is a short account by Mr. Nunn of the case of a girl, æt. 17, in whom there was curvature forwards in the lower part of the thigh, attributed to disease eight years previously which had interfered with the growth of the hinder part of the femur. That the deformity represented in Fig. 1 was not the result of fracture, as has been suggested, is shown, among other things, by the precise similarity of the appearances to those in the case of the young woman previously described by me in which the change took place gradually.

(For report of the discussion on this paper, see 'Proceedings of the Royal Medical and Chirurgical Society,' Third Series, vol. i, p. 60.)

DESCRIPTION OF PLATE I.

Back-knee, Knock-knee, Bow-knee, and other Deformities resulting from Defect of Growth at the Epiphysial Lines (Professor HUMPHRY, M.D.).

FIG. 1.—Outline of a limb with "back-knee," showing the bend backwards of the leg close to the knee.

FIG. 2.—Bones from the same. The tibia is sharply bent backwards near the upper articular end, which presents an oblique surface upon which the femur rests. The upper end of the fibula extends above that of the tibia.

FIG. 3.—Section of the tibia on a larger scale, showing the sharp bend backwards and the trace of the epiphysial line, which is oblique—parallel, indeed, with the articular surface, indicating that the growth of the shaft in front (on the concavity) has fallen short of that behind (on the convexity).

FIG. 4.—The upper ends of the tibia and fibula of a monkey, showing a bend forwards.

FIG. 5.—The upper end of a humerus in which the head is much below its proper level, in consequence apparently of insufficient growth of the shaft at the inner part of the upper epiphysial line.

FIG. 6.—The bones from a case of "knock-knee," showing the stunted condition of the outer condyle, or rather of the outer condyloid part of the shaft, with slight bulging and irregularity along the outer part of the epiphysial line.

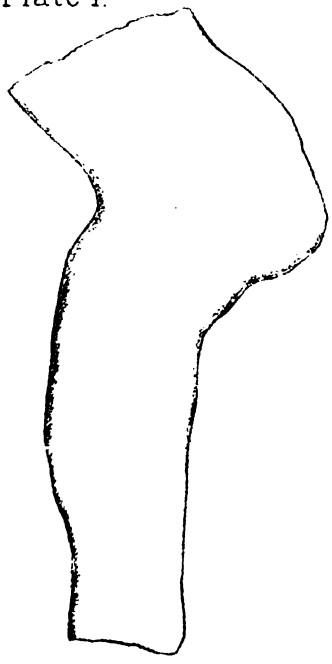

Fig. 1.

Fig. 2.

Fig. 5.

Fig. 3.

Fig. 4.

Fig. 6.

Dantzsson & Co. lith.

ON A CASE OF ACTINOMYCOSIS HOMINIS.

BY

R. DOUGLAS POWELL, M.D., F.R.C.P.,

PHYSICIAN-EXTRAORDINARY TO THE QUEEN; PHYSICIAN TO THE MIDDLESEX HOSPITAL; CONSULTING PHYSICIAN TO THE BROMPTON HOSPITAL FOR CONSUMPTION AND DISEASES OF THE CHEST.

RICKMAN J. GODLEE, M.S., F.R.C.S.,

SURGEON TO THE UNIVERSITY COLLEGE HOSPITAL AND TO THE BROMPTON HOSPITAL FOR CONSUMPTION AND DISEASES OF THE CHEST.

AND

H. H. TAYLOR, F.R.C.S.,

RESIDENT MEDICAL OFFICER, BROMPTON HOSPITAL.

With an appended Report on the Morphology of the Fungus by

EDGAR CROOKSHANK, M.B.,

PROFESSOR OF BACTERIOLOGY AT KING'S COLLEGE, LONDON.

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THE cases of the disease now known as actinomycosis, which had occurred in cattle before it was recognised as a distinct lesion by Bollinger[1] in 1877, were included under different headings of cancer, tubercle, osteosarcomata, &c., according to the dominant clinical features and morbid appearances in each particular case.

Bollinger[1] first recognised the disease as caused by a micro-parasite, which from its radiate appearance was named by Hartz[2], his botanical colleague in the inquiry, actinomyces. In the following year Israel[3] first recog-

[1] Bollinger, "Ueber eine neue Pilzkrankheit beim Rinde," 'Centralblatt für die medicinischen Wissenschaften,' 1877, No. 27.

[2] Hartz, loc. cit., p. 484.

[3] Israel, "Neue Beobachtungen auf dem Gebiete der Mykosen des Menschen," 'Virchow's Archiv,' 1878, Bd. 74.

nised and described the disease in the human subject, but it was not until two years later that Ponfick[1] drew attention to the identity of the parasite as it appeared in both man and beast.

In 1845 Langenbeck observed and figured the micro-organism from an abscess associated with vertebral caries.

To Lebert, however, must be yielded priority of publication, for in his 'Traité d'Anatomie Pathologique,' 1857, he describes and accurately figures the parasite, although he was unable to identify its nature. Lebert's case has the additional interest for us that it was one of pulmonary disease supposed to be cancerous in nature and terminating in abscess of the chest wall. Robin also, in his treatise on the microscope, 1871, p. 575, speaks of having two or three times met with, in the pus of old and deep-seated abscesses, yellowish grains of $\frac{1}{10}$th mm. in diameter, the microscopic features of which he accurately represents, but of the nature of which he frankly confesses himself to be ignorant.

After several fruitless attempts by other German experimenters to inoculate the disease from one animal to another, Johne[2] succeeded in doing so, and his results were later confirmed by Ponfick. Israel[3] appears also to have succeeded (1885) in inoculating a rabbit from the human subject, although some doubt was cast upon his observations at the time.

Boström[4] is reported to have cultivated the fungus taken from the human subject, the threads growing, but the club-shaped bodies remaining sterile. His cultivations are described as consisting of thread-forms, rods, and cocci. He regarded the clubs as involution forms, and the result of his observations led him to believe that the organisms belonged to the bacteria, and probably were closely allied to the streptothrix.

[1] Ponfick, 'Die Actinomykose des Menschen, eine neue Infectionskrankheit,' 1881.

[2] Johne, 'Deutsch. Archiv für Thiermed.,' 1881.

[3] Israel, "Kenntniss der Actino. des Menschen," 'Klin. Beiträge,' 1885.

[4] Boström, 'Jahresbericht über path. Org.,' 1886.

Israel, in the paper above alluded to, classifies thirty-eight human cases, according to their probable modes of invasion, viz.:

Group 1.—Invasion through the mouth and pharynx.

Group 2.—Invasion through the respiratory passages.

Group 3.—Invasion through the intestinal tract.

Group 4.—Source of invasion uncertain.

Moosbrugger added many more to the list, and some collected by Crookshank brings the total number of recorded cases up to 140.[1]

Although such numbers of cases had been met with on the Continent and a few in America, no case was recognised in this country until 1885, when Dr. John Harley read his paper before this Society on "A Case of so-called Actinomycosis of the Liver," which he, however, maintained to be a case of tubercular disease. Dr. Harley's faithful delineations, and the able observations of Drs. Theodore Acland and Sharkey place it beyond doubt that this was a genuine case, the first that had been recognised in this country. In 1885 Dr. Shattock brought before the Pathological Society two specimens of this disease, also affecting the liver, which had been placed unrecognised in the museum of St. Thomas's Hospital. Mr. Frederic Eve, in 1887, published an account of a case from the Museum of the College of Surgeons, which had been regarded as tubercular, and doubtless our museums may yet be found to yield further specimens of the disease. In 1886 a case occurred in the Bristol General Hospital, under the care of Dr. Markham Skerritt, which was recognised after death.

There has been great doubt as to whether the cases reported in this country were identical in nature with those met with in Germany. Dr. Acland, who employed for the first time Gram's method of staining, and thus beautifully demonstrated the threads, appears not to have noticed the clubs of the fungus. In the 'Pathological

[1] A table of these cases which it was intended to have published with the paper is unavoidably omitted owing to the difficulty of verifying all the references.

Transactions' for 1886 he says, "The rays consist, not of club-shaped rods, but innumerable fine threads," which he figures. In Israel's cases, on the other hand, the clubs were demonstrated but not the threads. Dr. Bristowe, in the sixth edition of his work on medicine (1887), says: "In the cases which have been met with at St. Thomas's Hospital the microscopic characters present some important differences from those which have just been described, and seem to indicate a different, though probably an allied, micro-organism. There are no club-shaped rods, but the yellow botryoidal masses are made up of extremely delicate threads, some single, some branched, springing from groups of necrosed cells in the centre, and at the periphery often prolonged into the inflammatory matter in which the masses lie embedded." Dr. Acland concluded ('Path. Trans.,' 1886, p. 548) "that there are probably two diseases which, though alike in their clinical history, are caused by different organisms."

It is hoped that the case now to be related—the first example of actinomycosis of the lung in the human subject that has been recognised during life in this country—will prove of interest to the Fellows of the Society.

(1) As affording a good clinical illustration of the disease.

(2) As yielding material permitting of a definite and satisfactory answer to some of the important questions which still remained unsettled respecting this mysterious and fatal malady, viz.:

(*a*) Is actinomycosis hominis identical with the bovine affection?

(*b*) Are not the two varieties supposed to be met with in man really identical, *i. e.* the product of one organism?

(*c*) What is the real nature and function of the club-shaped processes of the fungus and their relation to the threads?

(*d*) Can the disease be inoculated in animals from a pure culture of the fungus of human source?

(*e*) To what botanical order may the fungus be now relegated?

George W. H—, æt. 9, residing at Highgate, was admitted into the Brompton Hospital, under the care of Dr. Douglas Powell, on October 8th, 1888.

Family history.—His father is alive and well and works at a dairy situated in the north of London, as milker and carrier. His mother also is living and healthy. A brother, aged seven years, and two sisters, aged respectively six and four years, are alive and well, and none of the family have died. His father's sister died, aged twenty-four, of phthisis, and his mother has lost two brothers, aged respectively sixteen and twenty-six, of the same complaint; and her half-brother by the same father, aged twenty-one, is now suffering from phthisis, three other half-brothers being healthy.

Personal history.—Up to the time of onset of his present illness patient had enjoyed good health, with the exception of measles and whooping-cough when quite young. Four months before admission, early in June, 1888, he became languid and disinclined to do his work or to play, and he gradually began to complain of a tenderness and pain in the right side of the chest when touched or washed. The parents date his illness from a blow received at school behind the ear, which raised a large lump. After this he remained at home for a week with headache, constipation, and languor; he returned to school, however, until the holidays commenced, early in July. He was then, on account of his failing health, sent to Brighton for a month, and returned home in August only slightly improved and still listless. The parents state that the boy first complained of pain in the chest about the end of August, *i. e.* six weeks before admission to hospital. For the six weeks following his return from Brighton the boy accompanied his father two or three times a week to the cowsheds, where there are about 150 cows, remaining there for two or three hours at a time. The father knows of no illness which has lately affected any of the cows, and is sure that none have died during the past year. Two of us, Prof. Crookshank and Mr. Taylor, visited the dairy on Nov. 17th,

and found the cows looking healthy, and were assured by the owner and by two of the milkers, whom, as well as the boy's father, we questioned, that there had been no cases of "wens" or "clyers," or other manifestations of actinomycosis on the farm.

The patient had had a slight hacking cough during, at all events, the latter part of his illness, but up to the time of his admission there had been no expectoration, and he had never had hæmoptysis. He had lost flesh during the whole time of his illness, and had suffered from night sweatings during the last month. His breathing had become obviously shorter during the past two months. He had not suffered from diarrhœa.

State on admission.—The patient was a thin, well-featured, bright-eyed boy, with dark hair, long eyelashes, and somewhat hectic appearance. He complained of pain in the chest below the right nipple, especially felt on drawing a deep breath or on coughing. Pulse 120, resp. quickened, temp. 101°. On inspection the right side of the chest was obviously larger than the left (one inch larger to measurement), and restricted in movement, and about the mammary region the intercostal spaces were obliterated by a smooth and rather hard swelling of the tissues having its centre in the fifth space in the nipple line. The swelling was exceedingly tender, slightly œdematous, and at this time no distinct fluctuation could be felt, nor was there any blush of redness on the surface. On sitting the boy up, the head was observed to be inclined to the affected side, and the scapular angle correspondingly tilted inwards, the spine being slightly curved in the dorso-cervical region with concavity to the right. In the posterior axillary line a second larger swelling was observed, corresponding with the seventh, eighth, and ninth ribs. This swelling was also tender, brawny to the touch, and suggestive of the early stage of a pointing empyema. The heart's apex-beat was half an inch to the left of the nipple line.

The percussion note on the right side was resonant, of

somewhat Skodaic quality, to the second space in front; below that point dull, the dulness being complete at the fourth cartilage. Posteriorly there was dulness from the lower third of the scapula to the base. It was observed, however, that the upper line of dulness was not horizontal but slanted downwards towards the spine, so as to be at a lower level there than in the mid-scapular and axillary lines.

Over the dull area the vocal fremitus was lost, and the breath-sounds were absent. In the subclavicular and superior scapular regions the respiratory murmur was weak but vesicular. On the left side the resonance and respiration were good.

A short systolic murmur was audible at the right third cartilage, otherwise the heart-sounds were natural.

The liver dulness blended with that of the thorax, and did not extend below the cartilages, nor could the margin of the liver be felt.

Spleen normal.

From the hectic temperature and symptoms and the physical signs above related, the case was regarded as one of empyema. Two fine needle punctures, however, in the fourth and fifth spaces, anterior axillary line, produced only a little blood.

October 15th.—Whilst under chloroform for more complete exploration, but before any puncture was made, the patient expectorated about half a dozen sputa of bright blood. A fine trocar was introduced by Mr. Godlee at the centre of the posterior bulging, and some drops of blood came out through the cannula, which on examination contained only fibrine and blood-cells.

The temperature was high during the night, and the cough troublesome, but without expectoration. As a rule the patient sleeps well, takes food fairly well, and is very placid and cheerful, being free from pain except when touched or on coughing.

26th to 27th.—Patient has notably lost flesh since admission, and the appearance of hectic is more marked. The general tenderness of the right side is less marked,

and is as before chiefly felt over the two swellings. The swellings are more prominent and are distinctly elastic (fluctuating ?). There is some redness over the posterior swelling. The upper line of dulness anteriorly slants slightly downwards and inwards, and above the dulness at C, especially near the sternum, a distinctly Skodaic quality of resonance is elicited. There is a slight alteration in the level of absolute dulness on changing from the sitting to the recumbent posture (one inch, Taylor, Powell). The systolic murmur at D is distinct, short and rough. Two glands slightly enlarged and moveable are to be felt in the right axilla, and on this side of the neck along the anterior margin of the sterno-mastoid some slightly enlarged glands are perceived. On the opposite side the glands are not enlarged.

The patient had slight herpes on the lip on admission, which has completely cleared. He has otherwise complained during his illness of no sores on the face or mouth. The milk molars are much decayed; the permanent teeth, however, are sound, except that the enamel is deficient over some of the cusps.

At this time it was feared that there was malignant growth in the thorax, but the idea of there being pus in the pleura was not wholly abandoned.

November 1st, 6 p.m.—The patient was anæsthetised after the thorax had been again carefully examined. At this time there was, extending downwards and slightly forwards from the original seat of the posterior swelling, a pyriform bulging, three inches in length, with the larger end depending, yielding semi-fluctuation over its whole area, and giving no impulse on cough. The other signs were as before described.

The needle of an exploring syringe attached to an aspirator was inserted to the hilt by Mr. Godlee into the upper and posterior of the two swellings; nothing was obtained; on partially withdrawing the needle some soft yellowish stuff resembling semi-caseous pus came with difficulty into the syringe. An incision was made into the

swelling, and a large collection of similar material with some fresh blood was found between the ribs and the skin. The finger inserted came upon a bare rib (seventh or eighth) below the incision, *i. e.* between the swelling that had been incised and that below it. It was found impossible to introduce more than the tip of the little finger between this rib and that above it, and a pair of sinus forceps and dressing forceps, passed between them and expanded, gave exit to no pus. After further consultation it was decided to more thoroughly explore the pleura, and a piece one inch in length of the upper (sixth or seventh) rib was removed. The pleura was then incised, and the opening having been dilated by dressing forceps the finger was passed in and entered a soft collection of the same material as had been found outside. No limitation of the mass could be felt; some partially clotted brain-like material mixed with blood escaped, but there was no actual flow of fluid matter. The bleeding was very considerable. Strips of lint soaked in sublimate lotion, 1—2000, were inserted to plug the wound and a dressing of carbolic gauze was applied.

Towards the end of the operation there was a little expectoration of blood.

2nd.—The patient passed a fairly good night, there had been no hæmorrhage, and he was very comfortable. Portions of the crude material removed from the patient yesterday were submitted to Mr. Taylor for examination. Fresh sections taken from the brain-like material were made the same evening and stained with alum-carmine. The structure was found to be chiefly composed of small granulation cells with, in places, some epithelioid cells mostly caseating, many of them having undergone complete fatty degeneration. These cells were embedded in a fine fibrillated tissue. A great number of small rounded openings were seen giving at parts a sponge-like appearance; there were also many evident blood-vessels. There were also observed several deeply stained bodies having the recognisable characters of actinomycosis.

At the earliest opportunity specimens hardened in alcohol were stained by Gram's method, and the fungus was demonstrated in its entirety, exhibiting both threads and clubs, the latter, however, not taking the stain. These specimens were submitted to Prof. Crookshank for confirmation, and he was invited to assist in the bacteriological investigation of the case.

4th—8th.—On the morning of the 4th the wound was dressed, discharge found to be purulent, and very offensive. Strips of lint removed and iodoform blown into cavity after it had been syringed out with carbolic lotion 1—40. Patient feeling better, slight irritating cough, no expectoration. On subsequent days the same treatment was adopted. It was found that the lower swelling communicated with the upper, and it subsequently burst externally through a small opening leading to a sinus which communicated with the upper wound.

There was no fungating through the wound. Emaciation increasing; pulse 130; respirations quiet, and aspect pallid, but the boy was free from pain, cheerful and placid. There was no enlargement of the liver. The upper level of dulness reached the second rib, and the level did not alter with position. Some rather fine crackles were heard over the second and third ribs with very weak breath-sound. Posteriorly the dulness reached to half scapula, above which level the breath-sounds, although weak, were fairly good.

On injecting carbolic lotion into the wound, the patient coughed and expectorated a muco-purulent sputum and some froth.

10th.—On removing the dressings they contained a small amount of discharge. A probe was passed into the small opening in the lower abscess, and about two drachms of almost pure blood escaped. On pressing on the surrounding tissues thick blood-stained pus escaped freely; this was seen to contain innumerable minute white granules resembling the bodies found in bovine actinomycosis. Prof. Crookshank collected the pus, and inoculated a number of tubes of various nutrient media. The surface of

the wound was also covered with yellowish-white granules, glistening, and not readily removed. When scraped off, the stuff was found to contain iodoform and abundant ray-fungi.

10th—16th.—Under chloroform two anterior abscesses were opened, and the opening below the original incision enlarged. Thick yellowish pus with characteristic granules escaped freely; and there was considerable hæmorrhage, causing some degree of collapse. A little of the more solid material was removed by scraping. Prof. Crookshank was present with sterilised tubes, and took a considerable quantity of pus and thick stuff for inoculation into animals. Wounds plugged with lint soaked in 1—20 carbolic solution. No fœtor. The whole of the right thorax more or less puffy, and along the ribs both above and below the front incision were several points of fluctuation.

17th.—Two fresh places are becoming prominent and soft at the anterior part of the chest. The wounds have all a languid appearance, edges purplish, granulations pale and large; a thickish pus adheres to them in places on which, and on bare granulations, are seen minute dirty yellowish granules, varying much in size, one of them as large as a millimetre across. These can be readily shown by microscopic examination to be portions of fungus. As yet no growth has protruded from the wounds. Plenty of granules are visible on the dressings, and some doubtful spots are seen in the expectoration, which is still scanty.

20th.—Patient appears just to hold his own. The general swelling of tissues over the thorax gradually increases and becomes more diffused. There is no tenderness over the spine. The opposite side of the chest is not involved. The fungus was detected in the sputum for the first time to-day. No tubercle bacilli have at any time been detected. Urine, sp. gr. 1028, acid, no albumen or sugar; gives decided indican reaction; rapidly undergoes decomposition.

24th.—A fresh prominence near the angle of the scapula has become soft and tender, and one behind the anterior

incision has become purple and will soon burst. The wounds are now filled up with a curdy yellowish-white material surrounded by pale red granulations.

With some variations from day to day the boy gradually lost ground, becoming more emaciated and pale.

December 18th :—Face pale, puffy; eyelids distinctly œdematous, especially on the right side, to which the patient habitually inclines, with his head low and his trunk flexed and twisted to the right. Superficial veins on right side of abdomen enlarged; tongue red, slightly aphthous; pulse always very quick. Several swellings have appeared upon the back, all of which fluctuate, which are not opened as they are not painful. The wounds from former incisions present a thick, yellowish-white, slightly glistening surface, and similar masses are fungating through other places in which abscesses have spontaneously given way. Over the left side of the chest the resonance and respiration continue good. The breath-sounds are also fairly good to the second space on the right side, and posteriorly the air penetrates well to the lower third of the scapula.

January 1st :—There had been for some days a slight improvement in the patient's general condition, with a lower temperature range and pulse. The liver, was, however, now distinctly enlarged, its margin being felt just above the umbilical level; surface smooth and flaccid. The improvement in the patient's general condition continued through January. Although he did not gain flesh the activity of the growths seemed somewhat checked, and there was a tendency to contraction of the openings. The chest signs remained stationary, except that a few râles appeared over the right upper scapular region.

22nd :—The curvature of the spine is very marked, and from behind the left side appears much larger, there being considerable separation of the ribs. Resonance slightly impaired at left base. Breathing puerile over this side. Breathing distinct at right apex, but weaker than on opposite side. Few râles. Breath-sounds can be heard to eighth rib. Liver not so easily felt. ? Spleen enlarged. Growth

does not seem now to be making much progress. General condition improved; brighter and stronger, although he is getting very thin.

No change of importance took place from now till death. At times he seemed to improve, at others the end seemed to be very near, but he frequently rallied again for a time. The discharge from the openings was pretty free, but no fresh abscesses appeared, nor did the disease appear to be spreading outwardly.

He quietly died on February 26th at 8.50 a.m.

Abstract from the Post-mortem Report. Thorax.—There was a large mass of soft material occupying the pleural cavity of the right side from about the level of the second rib downwards. It was homogeneous, appearing to consist of the same material in different stages of degeneration. Very soft, pultaceous, and canary coloured, much resembling coarse, badly-made mortar. There was also a large amount of this material between the base of the lung and the liver, the diaphragm appearing to have been incorporated in it. There were some recent adhesions in the upper part of the pleura.

Lungs.—Right: The lower anterior part of the lower lobe and the middle lobe converted into tough fibrous material, which has an irregular interlobular distribution, the bands enclosing small pinkish areas like altered lung tissue. Here and there in the midst of the fibrous growth there are irregular, canary-coloured masses just like that described above. The upper lobe is plentifully studded with grey nodules, the size of a hemp seed, some slightly pigmented, and exactly resembling tubercular nodules. Left: Aerated throughout, but contains scattered nodules of the size of a pea to a small Spanish nut, which, on section, have the characteristic canary-coloured appearance.

Between the liver and diaphragm there was a collection of pultaceous matter similar to that described above, but the liver itself appeared healthy. On section, however, there was seen an abscess about one inch below the upper surface, of the size of a small orange. Its wall was

about a quarter of an inch thick, and consisted of fibrous tissue. The contents consisted of tenacious yellow pus, which had a trabeculated appearance.

The right lateral sides of the dorsal vertebræ were covered over by the growth and superficially eroded.

Some of the ribs also between which the growth had passed to get to the outside of the chest were eroded.

Nothing worthy of note was found in any other of the organs.

Remarks.—The etiological history of this case does not throw any definite light upon the exact mode in which the disease originated. There is no evidence that the disease was in any way directly communicated from a bovine source. The family disposition—not very strongly marked—of the patient to phthisis may have rendered him vulnerable to attack; it is at all events worthy of note that the ray fungus flourishes best in a nutrient material—gelatine agar-agar, which is also a favourite pabulum for the cultivation of tubercle bacilli.

The clinical features of the case, both as regards the symptoms and signs, were in the first instance those of empyema. On puncture, however, no pus could be obtained, and on further exploration the evacuation of semi-clotted material resembling a mixture of fluidified brain-substance and blood, quite unlike anything which had in our experience been removed from cases either of intra-thoracic growth or empyema,—seemed to us after brief consultation to justify the removal of a portion of the rib for more thorough exploration of the pleura. It is true the case looked like some degenerating growth, but certain signs which have been above related—and especially the somewhat slanting and shifting upper line of dulness and the Skodaic resonance below the clavicle—led to the hope that there might still be some fluid collected behind a thick caseous layer in the pleura, or *possibly* connected with some degenerated growth in the pleura, such as we had once before met with in a case of dermoid tumour of the lung. At the end of the exploration, however, we

returned to the belief that we were dealing with an anomalous degenerated and softened malignant growth, the extreme vascularity of which gave us some uneasiness.

It was only on careful examination of the material removed that a diagnosis was arrived at. There had been no previous opportunity of examining the sputum, or the nature of the disease would probably have been recognised, for it may be here observed that, as Dr. Acland has pointed out, the same method of staining—Gram's method—which serves to demonstrate the tubercle bacillus, brings out with great clearness and beauty the mycelium threads of the ray-fungus. Moreover, the actinomycotic tufts can be readily recognised by the experienced eye in sputum or purulent discharge as greyish-yellow points of about the size of a small pin's head, and such points simply placed unstained under a cover-glass[1] and examined with a fairly high power will show exceedingly well the characteristic clubbed processes of the fungus. This latter fact has indeed been the chief means by which the discrepancies in the observations in this country and on the Continent with regard to the appearance and nature of the fungus have been reconciled. For whereas on the Continent fresh specimens have been examined and the clubs demonstrated, in this country only post-mortem specimens in hardened tissue have hitherto been examined, and the stain which has demonstrated the mycelium—hitherto unobserved in Germany—has thrown the clubs into obscurity.

In its pathology this disease is characterised by the plentiful production of inflammatory granulation tissue around numerously scattered and spreading actinomycotic centres.[2] The granulation tissue is intensely vascular, the centres evascular, and as the latter extend degeneration ensues in their interior—*necrosis, suppuration,* and the coalescence of adjacent abscesses, resulting in extensive destruction of tissue. Thus closely allied in intimate pathology to tubercle, actinomycosis differs strikingly in one important feature of its clinical pathology, viz. its dis-

[1] See Plate II, figs. 1 and 2. [2] See Plate III, figs. 1 and 2.

position to invasion beyond the bounds of the organ first attacked, *across country*, so to speak, through adjacent tissues to other parts or organs. This feature, and the fact that the apex of the lung is rarely involved, separates it from tubercular lung affections; and the clinical distinction from tuberculous diseases was in our case further emphasised by the contrast between the extended area of dulness and the comparative auscultatory silence. This feature may, however, in the earlier stages not hold. *Empyema* and *sarcoma* of the lung are far more likely to be confounded with this affection, and probably can only at certain stages be clinically distinguished from it—as in this case—by examination of the sputum or exploration of the growth, and the microscopical examination of materials thus obtained.

It is not easy to decide, even after post-mortem inspection in our case, where the disease originated, although it is clear that it flourished chiefly in the lower two thirds of the pleural cavity, infiltrating the chest wall and fungating through the cutaneous surface, denuding the adjacent vertebræ, and commencing to invade both the diaphragm and pericardium.

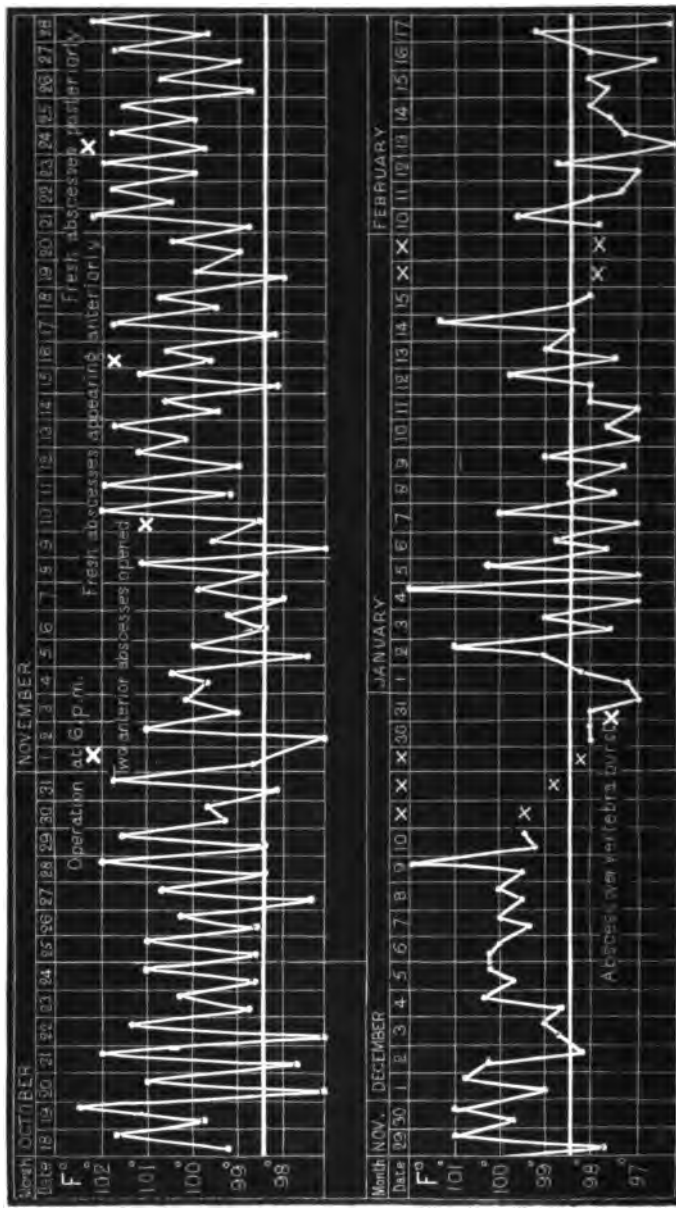
The lung was collapsed backwards and upwards, toughened and fibroid, containing also many centres of fungous disease, but the evidence is not sufficient of there having been any considerable primary fungous disease of the lung and subsequent cicatrisations. On the contrary, the post-mortem evidence rather favours the view of the compressed lung having become the seat of a secondary actinomycosis; and the left lung, otherwise healthy, also presents centres of a similar kind in an early stage.

On the whole, it would seem probable that the germs of the fungus, having gained entry through the respiratory tract, have been conveyed through the lymphatics to the pleural surface, and there germinated and flourished in inflammatory materials derived from the two layers of the pleura and their subjacent tissues, the bulk of the growth being in the thoracic wall.

Another remarkable feature in the observed pathology of this disease, viz. its tendency to travel onwards in one direction, leaving a healing lesion behind, has been especially noted in cases in which the glandular system has become invaded, and if the observation be correct, holds out hope that some means of coping with it in treatment may be found. It would appear from the observations on the organism recorded more fully in the appendix, that the actinomyces is a fungus of a much higher order than the various bacilli with which we are familiar, and it is possible that it may be consequently more tender to the influence of remedies. The keen struggle between the organism and the cell-life it provokes, to which the morbid specimens bear witness, points to the wisdom of trusting in treatment largely to the maintenance of the vital powers of the unfortunate host, whilst endeavouring to impair that of the parasite.

The treatment of this case by drugs was not vigorously prosecuted. A course of arsenic was prescribed but without notable effect until anæmia and disturbance of the stomach ensued. Iron and cod-liver oil helped to maintain the strength of the patient, and he was allowed a most liberal dietary and a little wine. The surgical measures have been detailed, and although the patient suffered considerable shock from the loss of blood endured in the first exploration, the subsequent evacuation of the chief abscesses as they matured (see × ×, Temp. Chart) was attended with relief to suffering and improved appetite.

There is only one further point that calls for comment, viz. the prevalence of the disease. A considerable number of cases has been recorded, and a few have been ascertained to have occurred in this country. We can, however, recall no case of the kind above related as having occurred within our experience, and as the Brompton Hospital is an institution in which the greater proportion of cases are those of chronic chest diseases coming from all parts of the kingdom, whose period of treatment in hospital varies from two to three or more months, and as


Operation at 6 p.m.
Two anterior abscesses opened
Fresh abscesses appearing anteriorly
Fresh abscesses posteriorly
Abscess over vertebra opened
OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY

such striking clinical features and post-mortem appearances could scarcely have been overlooked the rare occurrence of the disease in this country up to the present time would seem beyond question.

APPENDIX.

On the Morphology and Life-History of the Fungus obtained from the Case, and Inoculation Experiments. By EDGAR M. CROOKSHANK, M.B.

Historical retrospect.—In order to explain the various mycological points of interest connected with an investigation of the fungus in this case, it will be necessary to enter fully into the micro-pathological history of the cases which have been previously met with in this country.[1]

Morphology of the fungus in the English cases.—(*a*) *In the first three cases.*—In Dr. Harley's case, which has already been referred to, Dr. Acland discovered in sections stained by the method of Gram a kind of mycelium, and Dr. Harley appended to his paper a note with the statement, "I have found traces of an extremely fine mycelium-like structure, but none of the club-shaped asci which are regarded as characteristic of actinomycosis bovis." The nature of the disease was not suspected during life, and therefore the fungus had not been examined in the fresh state.

At the post-mortem examination Dr. Harley regarded the case as tubercular, but Dr. Sharkey and Dr. Bristowe

[1] *Vide* Appendix to the 'Report of the Agricultural Department of the Privy Council' for 1888.

reserved their opinions. As I have already stated, subsequently microscopical sections prepared by Dr. Acland revealed the true nature of the disease.

At the discussion which followed the reading of this paper Dr. Seymour Sharkey remarked:—"There can hardly be any question that the case is one of an actinomycosis. I say *an* actinomycosis, meaning that the fungus grows in a radiating manner. I do not say that it is a case of actinomycosis bovis." Dr. Acland, on the same occasion, described the peculiar filamentous structure.

Mr. Shattock only briefly alludes to the fungus in the cases which he recognised. Microscopic sections stained with methylene blue were described as follows: "The fungus composing the centre of each inflammatory system forms a compact, irregularly spheroidal, minutely fibrous mass." But a minute description of these specimens was given by Dr. Acland in the 'Transactions' of the Pathological Society, vol. xxxvii, p. 545. It was alleged that in these preparations the fungus bore only the most superficial resemblance to actinomycosis bovis. The rays which he had had an opportunity of examining consisted, "not of club-shaped bodies, but of innumerable fine threads, which were single, branched, twisted, or straight, and in some cases divided transversely." In three out of four cases which he had studied, the organism seemed entirely different from that found in cattle. The fourth had been under the care of Dr. James Israel, of Berlin. In this case the characteristic club-shaped bodies were present in considerable numbers, and from microscopical examination it seemed to be the same as actinomycosis bovis. It was thought possible that there might be two diseases in man which, though alike in clinical history, were caused by different organisms.

On the occasion of Dr. Acland's paper I exhibited by request a series of sections of bovine actinomycosis which I had stained by the methods somewhat recently introduced. I fully agreed that there was a very striking difference in the appearance of the fungus in the two sets of

preparations. I pointed out, further, that the mycelium recalled the structure of a hyphomycetous fungus, and that I had not observed it in any of the bovine cases which I had examined.

Though the difference in these sections was very striking, the naked-eye characters of the new growths and the clinical history of the disease seemed fully to justify the publication of these cases provisionally as actinomycosis, and I considered that it would require further research to clear up the nature of these differences. The network of filaments and the absence, as alleged, of clubs in all these cases seemed to indicate a very important distinction, as the clubs are certainly the characteristic feature of the disease in cattle. This subject, therefore, claimed my attention, and I determined to take every opportunity of obtaining material and endeavouring to work out the relation of the disease in man to the disease in cattle.

(*b*) *In the fourth case.*—It was therefore with extreme interest that I received information of another case of actinomycosis. At the annual meeting of the British Medical Association at Dublin, August, 1887, Dr. Markham Skerritt described his case, the details of which had been published in the 'International Journal of Medical Science.' On microscopical examination of the growth in this case it was stated that the fungus appeared to consist of a network of filaments matted together in the middle of the advancing ridge and spreading radially outwards among the surrounding leucocytes. "Certain somewhat club-shaped bodies were apparently present, but out of a large number of sections these were visible in only two or three, and it is open to doubt whether the appearance may not be due to the accidental arrangement of the fine filaments which constitute the bulk of the growth."

At the discussion which followed I repeated the statement which I had made at the Pathological Society of London, adding that I looked forward with great interest to studying Dr. Skerritt's specimen, as some definite

statement, and, if possible, explanation of these differences were very necessary.

In commenting on Dr. Skerritt's case in the 'British Medical Journal,' p. 97, 1887, Dr. Acland reports the result of submitting his microscopical preparations to Dr. Israel and to Prof. Koch. "The majority of cases," writes Dr. Acland, "observed in Germany, are undoubtedly of the same nature as actinomycosis bovis, but Dr. Israel and Prof. Koch, to whom I have shown my specimens, are of the opinion that there is no evidence to show that these cases which have been recorded in England, all of which affected the liver, are the same, though with certain insufficient methods of preparation and staining the appearances are sufficiently like to lead to the supposition that they are of a similar nature."

Re-examination of the first and fourth cases.—On referring to the drawings of Dr. Skerritt's microscopical preparations I hoped that some light would be thrown upon the cases which had been previously described. But neither Gram's nor Plaut's method had been employed, and the filamentous network was not shown as in Dr. Acland's preparations, while the presence of the characteristic clubs was acknowledged to be open to doubt. I took an early opportunity of asking Dr. Skerritt to be kind enough to allow me to examine a portion of the growth from his case, in the hope of ascertaining the exact relation of the fungus in this case to that in previous cases, and to the fungus in cattle. Dr. Skerritt acceded to my request, and on staining sections of the liver by the method of Gram I at once established the fact that this case corresponded with those which had been previously described, inasmuch as masses of the same delicate network of filaments were demonstrated.

The relation of the fungus in this case to the fungus found in bovine actinomycosis still remained to be settled. I determined to try a great number of different methods in the hope of arriving at a definite conclusion regarding the absence or presence of clubs. After making a very

great number of preparations, and employing the most varied methods, I was able in a few preparations to demonstrate typical clubs at the periphery of dense masses of filaments in such a way as to place the question of their existence entirely at rest. I concluded, from the exact correspondence in every other feature to the cases previously described, that the clubs were not really absent from the early cases, but had merely been overlooked, and if so the presence of these club-shaped structures clearly established that not only Dr. Skerritt's case, but also the previous cases met with in this country, were of a like nature, and they possessed the characteristic feature (clubs) of the fungus in cattle. In other words, by the clear demonstration of the co-existence of the filamentous network and clubs in Dr. Skerritt's case, all the cases met with in this country were shown to be related to each other, and to the bovine disease; but there nevertheless remained very striking differences between the sections which I had prepared from the two sources. With the method of Gram, and the method of Plaut and its modifications, the clubs are as a rule deeply stained, and the central portion of the rosette as a rule is unstained in bovine sections. The reverse occurs in sections from man, the clubs, as a rule, remaining colourless, and the central portion presenting a network of stained filaments.

These conclusions have been strengthened by Mr. Eve's case in which he has verified the presence of the club-shaped bodies, and I have been able to confirm the view I have taken in the case under the care of Dr. Powell. Here again I was able to establish the coexistence of clubs and filaments. The rosettes of clubs were most easily recognised in the fresh pus, while in sections stained by the method of Gram, precisely the same appearances were obtained as in Dr. Harley's and Dr. Skerritt's cases.

[1] At the discussion which followed the reading of this paper Dr. Harley acknowledged the similarity between this case and his own, but again alluded to the absence from the latter of the characteristic mycological structures. Dr. Harley has since submitted to me a bottle containing some of the granules

It may be asked how it was that both Dr. Israel and Prof. Koch failed to recognise in Dr. Acland's specimens the disease which had been more studied in Germany than in any other country. The answer is that the use of the method of Gram for human actinomycosis was discovered by Dr. Acland and had not been employed by the German observers. They were not therefore familiar with the appearances which resulted. Recently Moosbrugger and others have applied this method, and have obtained and figured the same appearances in their cases of actinomycosis, while the fact of this method having been first employed by Dr. Acland has not been appreciated. In conclusion, firstly, there can no longer be any question that precisely the same appearances are found in the English and German cases of actinomycosis; secondly, there are not two forms of actinomycosis in man, but all the cases are etiologically alike; thirdly, the club-shaped bodies are present in the fungus both from human and bovine sources, but in man the fungus appears to be invariably associated with a dense filamentous structure.

Morphology and life-history of the Actinomyces or Ray fungus.—I will now proceed to indicate, in a general description of the fungus obtained from Dr. Powell's case, the points which have been confirmed and the new facts which have come to light. This case is the first in this country demonstrated to be actinomycosis during the life of the patient; and as the patient continued under observation for some months, I had every opportunity of making

from his case. By examination in glycerine I was able to satisfy him completely as to the presence of clubs, and by cover-glass preparations stained by Gram's method and orange-rubin the clubs and filaments were demonstrated in the same preparation. The clubs in the latter case were not so distinct as in the glycerine preparations, and the filaments had a tendency to fall apart into granular fragments, but it must be remembered that the specimen had been kept in spirit for nearly five years. Dr. Harley has also kindly allowed me to re-examine the liver, and I was able to prepare sections in which I could recognise the clubs, though with some difficulty. With Gram's and Plaut's methods the same appearances were obtained as in the sections which I had prepared from Dr. Skerritt's case.

the minute and thorough investigation which I had been invited to undertake.

I saw the boy for the first time on November 10th, 1888.[1] There was a good deal of discharge on the dressing, and a close inspection of it revealed the familiar yellowish grains which a casual observer might mistake for grains of iodoform. On collecting some of the discharge in a test-tube, and holding it between the light and the eye, the tufts of fungus appeared as brownish or greenish-brown grains embedded in a muco-purulent matrix. On spreading some of the discharge on a glass slip and examining in precisely the same way that I have elsewhere described for examining bovine actinomycosis, the largest tufts of the fungus were found to be about the size of the head of a small pin. They had a distinctly sulphur yellow colour by reflected light, but appeared of a yellowish or greenish-brown tint by transmitted light. With a needle or a platinum wire flattened at the end into a miniature spatula, the grains could be readily picked out of the discharge or taken off the dressing and transferred to a clean slide and covered with a cover-glass. Examined with an inch objective, they had the appearance of more or less spheroidal masses of a pale greenish-yellow colour. On removing the preparation from the microscope and gently pressing down the cover-glass with the finger, the grains flattened out like specks of tallow, and on again examining with the same power they were found to have fallen apart into a number of irregular and sometimes wedge-shaped fragments of a faintly brown colour, affording a characteristic appearance. By preparing another specimen and covering

[1] For some time past I had brought the subject of actinomycosis to Mr. Taylor's notice, and had begged him to look out for cases at the Brompton Hospital. I have elsewhere shown that many cases of bovine actinomycosis are overlooked in this country, and I had therefore reason to suspect that the disease was also overlooked in man. Previous to November 10th Mr. Taylor had consulted me with regard to this case, and submitted a microscopical preparation which had been stained at my suggestion by the method of Gram. I desire to express my indebtedness to Dr. Powell and Mr. Taylor for the facilities given me for carrying on the investigation.

it with a cover-glass without completely flattening out the grains, the spherical, oblong and reniform masses of which the tufts were composed were recognised, with a sixth of an inch objective, as the familiar rosettes of clubs which are observed in cattle (Plate II, fig. 1). By examining the peripheral part of a rosette with a half-inch, and especially after pressing the grains into a thin layer, with or without the addition of a drop of glycerine,[1] the characteristic clubs were most readily demonstrated, and the most varied shapes observed, by carefully examining the form of the individual elements. As in the bovine fungus, every variation in form was found, from single clubs to clubs with lateral offshoots, clubs bifid at the extremity, palmate or fan-shaped groups and banana-like bunches. In many cases the clubs were divided by transverse fission into two, three, or more segments. As a rule the clubs were regular in shape, and of about equal size, while a few were conspicuous by their length. In other parts of a preparation the clubs were replaced by long slender forms, which were sometimes transversely divided into a number of short links. With suitable illumination many clubs were seen to taper off into a slender filament. In addition, there were free filaments, which were twisted, branched, and sometimes distinctly spirilliform. Many of the clubs were composed of layers differing in their refractive power, and many had the appearance of a central channel. There were also in the preparation small, highly refractive bodies, fat-granules, granular detritus, round-cells, pus-cells, and sometimes blood-corpuscles. The grains differed from those from a bovine source, firstly in the absence of that sensation of grittiness so often transmitted to the finger when pressing the cover-glass upon them; secondly in the presence of fine filaments; and thirdly in the slightly greater tendency of the tufts to retain their compact form. By teasing the grains in a drop of water[2] on a slide and examining the preparation with a sixth or a twelfth objective, the explanation of the third point is forthcoming, for

[1] See Plate II, fig. 1. [2] See Plate II, fig. 2.

by this means the clubs are washed away and a central core remains, which is composed entirely of a dense network of filaments. This can readily be observed by using a small diaphragm, and it will be found that the rosettes of clubs are now replaced by tangled masses having some resemblance to miniature tufts of cotton wool (Plate II, fig. 2). These filaments constitute the mycelial network which is seen in sections stained by the method of Gram; this can be readily verified by making a cover-glass preparation of the grains, and staining by that method. The characters of the fungus can readily be studied by proper illumination without staining. The clubs have a faintly greenish tint, and in form and arrangement are quite characteristic and easily recognisable. Permanent preparations of the fungus in the fresh state may be made by mounting in glycerine.

The fungus may be stained in alcoholic solution of eosin in the manner I have elsewhere described, or with orange-rubin, and in either case mounted in glycerine. But although the fungus can be detected without any staining process, there may sometimes be doubtful appearances, and then I would recommend that cover-glass preparations should be made and stained by Gram's method and with eosin. The filaments can be readily recognised, and this is of great value, as it forms an additional means for the diagnosis of the disease. I have further ascertained that in combination with orange-rubin we have a test that is as characteristic and useful as staining for tubercle bacilli. The discharge, scraping from a growth, sputum, or the isolated fungus is squeezed between two cover-glasses which are then slid apart; or the material to be examined is spread out into a film on a cover-glass, with a needle. The cover is then allowed to dry, passed through the flame in the ordinary manner, and then stained. The cover-glasses can be cleared in clove oil, the excess of clove oil being removed by gentle pressure between pieces of blotting paper, and then the preparation can be mounted in balsam and rendered permanent.

On examination of these specimens the masses of entangled filaments will be stained blue and the tissue elements pink (Plate III). These filaments vary very much in extent and character in different preparations. In some cases there are masses of short threads, which are straight or sinuous or twisted, and sometimes branched. In other parts the field is occupied by very short, straight, or curved and sometimes spiral fragments; in others again there are comparatively long strands. On examination with a high power and with careful illumination, some filaments will be observed to be moniliform, while others are provided with a terminal oval body.

There are also free spherical bodies, stained blue, which possibly represent the spores of the organism. If orange-rubin be used instead of eosin, the clubs will be deeply stained and easily recognised. But what is more important, this method enabled me to determine the exact relation of the threads to the club-shaped bodies. It has been suggested that the threads are not connected with the clubs, but are merely an adventitious micro-organism growing in the track of the ray fungus. I satisfied myself in fresh specimens that the clubs were attached to the threads, but only after repeated and careful examination. I therefore tried several staining methods in the hope of showing this more readily. But it was not until I employed orange-rubin in combination with the method of Gram for cover-glass preparations that I was able to afford a truly satisfactory demonstration. By this method the threads were stained blue and the clubs crimson. In the younger clubs the protoplasm of the thread could be traced into the interior of the club. In some of the older clubs the central portion took a yellowish stain, and in others the protoplasm was not continued as a thread, but was collected into a spherical, ovoid or pear-shaped mass. In others, again, there were blue grains scattered throughout the central portion. The sheath of the thread was stained pink; the protoplasm, stained blue, may either fill the sheath or be represented by small spherical or irregular grains, giving

a distinctly beaded appearance. I have tried the effect of various reagents upon the isolated grains. The grains were picked out of the pus and transferred to watch-glasses containing strong potash, xylol, and benzole. When returned to a slide and covered with a cover-glass and examined the clubs were found unaltered. Water or weak potash washed away the clubs, and the filament became easily distinguished. Ether and strong acids had no effect upon them. Corallin soda, Hanstein's violet, and iodine zinc chloride failed in giving any particular reactions. Hoffmann's blue stained the clubs, but without bringing out any structural details which could not be seen in unstained specimens.

Life-history and cultivation.—Boström succeeded in cultivating the fungus outside the animal body and, finding that his cultures consisted of what appeared to be cocci forms, short rods and threads, but no clubs, he advanced the theory that the fungus belonged to the bacteria, forming one of the Cladothrix group and possibly closely allied to the *Streptothrix Foersteri* of Cohn. In accordance with this view Boström regarded the clubs as comparable to the degenerate or involution forms which are often found in old cultivations of bacteria. They constituted in his opinion the lifeless organism.

According to the old theory, the actinomyces was a hyphomycetous fungus; the clubs were the flask-shaped structures or gonidia. In the hope of throwing some light on this point I have made attempts at cultivation upon a number of different media, and these experiments are still in progress. But I am able to report the result of employing glycerine agar-agar, which being a favorable medium for the growth of the tubercle bacillus suggested itself as a suitable soil for actinomyces.

The discharge from a freshly opened abscess was collected in sterilised tubes, and cultivations prepared with as little delay as possible. Some of the discharge was spread out on a sterilised glass slide, and the grains isolated with sterilised needles, and quickly transplanted to

the surface of the nutrient medium. The tubes were placed in the incubator at 37° C., and the result watched from day to day. For several days there was no promise of success to the naked eye, but gradually the grains began to change, and by the end of a fortnight there was an appreciable increase in their size. Numerous cover-glass preparations were made from what was originally a single grain, and on examination by the method of Gram the appearance was very striking. There could be no doubt as to the increase of the mycelial structure. The dense masses of filaments covered almost the whole area of the preparation. In parts less thickly covered there was a vast number of oval bodies and rod-like segments with a terminal enlargement.[1] These "crocus-forms" corresponded with the appearances previously described as met with in the interior of certain clubs (Plate IV). From this it would appear that some other condition was necessary for the development of the fully formed club, which is the result of the sheath of the thread undergoing some change, possibly mucilaginous, resulting in the formation of a thick investment to the clubbed mass of protoplasm at the end of the thread.

I am inclined to believe that these club-shaped bodies represent organs of fructification rather than that they constitute the result of degeneration or death. The difficulty in accepting the view of their being entirely a lifeless shape lies in the fact that daughter clubs can be observed growing from the mature clubs, and, further, on the bovine fungus I have been able to trace by this process of gemmation the stages in the development of a single club to a completely formed rosette.

In the unstained condition the clubs are found as a whole to be very regular in their form and arrangement, while by certain staining methods they can further be shown to have a somewhat complex structure. If we take all the characters into account, and particularly the minute structure and the relation to each other of the threads and

[1] See Plate III, fig. 3.

clubs, I think we are justified in the opinion that the club is an integral part of the living plant, and that these characters bring the fungus into relation with a higher group of micro-fungi,—the Basidio-mycetes, although the filaments regarded by themselves correspond with the characters of Streptothrix.

It has not been possible to trace every step in the life-history of the lowest of the Basidio-mycetes, but studied by the light of what is known to occur in many species, I think we may explain the life-history of the ray fungus as follows: The spores sprout into hyphæ, which form excessively fine, straight or sinuous and sometimes distinctly spirilliform threads, branching irregularly and sometimes dichotomously. The extremities of the branches develop the club-shaped bodies; the clubs are closely packed together, so that a more or less globular body is formed with a central core composed of a dense mycelium. The threads can be differentiated into an external sheath and protoplasmic contents by the method of Gram.

The club-shaped body appears to be developed partly from the sheath undergoing some change, possibly mucilaginous, as already suggested, while the interior of the club is continuous with the protoplasm of the thread. What further changes take place in the club-shaped bodies it is difficult to say; in all probability they represent the organs of fructification. The protoplasm in the interior of the club may possibly undergo changes leading to the development of spores which are ultimately set free. In some clubs the terminal segment is separated by transverse fission in the form of a globular body, a process resembling the formation of spores by abjunction. In others, again, the young forms sprouting from the mature clubs recall the formation of telentospores. In whatever way spores may be formed, there can be little doubt that they are set free in the vicinity of a rosette, and give rise to fresh individuals in the immediate neighbourhood, the ultimate result recalling, as has been previously suggested, the appearance of "fairy-rings." There can be

little doubt that the spores or young plants taken up by leucocytes are conveyed to a distance from the parent plant, and thus establish fresh centres of growth. According to the view which I have propounded, the filaments or threads may be regarded as extremely delicate hyphæ forming a dense mycelium, while the more familiar clubs are the basidia of the hymenial layer. I have mentioned that there are occasionally longer slender forms readily distinguished from the ordinary clubs; they possibly represent paraphyses or abortive elements.

There is considerable variation in the amount of mycelium. A piece of the growth which was removed by Mr. Godlee was hardened, and sections stained by the method of Gram and with orange-rubin. In some rosetted masses the centre was completely occupied by a dense network of filaments, while the clubs at the margin were stained by the orange-rubin. In others the central portion was structureless, and the mycelium formed a ring-shaped layer intermediate between it and the palisade of clubs. In others again the mycelium could scarcely be recognised. There was in this case also a slight difference from the earlier English cases in behaviour to staining reagents, in that occasionally here and there the clubs were stained by Gram's method, while with Plaut's method the clubs were distinctly stained, and the mycelium as a rule was unstained.

The above observations seem to justify the following conclusions:

(1) The morphological details in this case confirm the unity of all the English cases and tend to confirm the identity of this disease with bovine actinomycosis.

(2) The co-existence of rosettes of clubs and filaments supplies the evidence that was wanting to establish the unity of the English and foreign cases.

(3) The method of Gram with orange-rubin demonstrates the exact connection between the threads and clubs, and sets aside a theory that the filaments have no structural connection with the ray fungus, but represent an adventitious organism.

(4) The structure of a rosette consists centrally of a dense mycelial network, and externally of a hymenium of basidia.

(5) The clubs appear to be a stage in the life-history of the fungus probably connected with fructification rather than involution or degenerate forms.

(6) The fungus appears, on taking all the characters into account, to be closely related to the Basidio-mycetes though the filaments are very similar to Streptothrix.

(7) Cultivation outside the animal body does not yield any marked growth, but there is an increase in the mycelial structure with the presence of incompletely developed clubs and free spore-like forms.

Inoculation experiments.—Rabbits and calves were inoculated with material direct from the patient. I am not in a position to give all the details of these experiments, some being still in progress, but I can relate the results up to the present time.

(*a*) *Transmission from man to bovines.*—A calf, inoculated in the peritoneal cavity and killed seventy days afterwards, presented the following lesions. The peritoneum of the rumen was studded in the vicinity of the seat of inoculation with hundreds of growths, varying in size from a millet seed to a pea ; the larger growths were composed of several small ones. On stripping off the peritoneum and holding it between the light and the eye, the fungus could be detected with the naked eye in each individual growth. By incising a growth and examining a scraping under the microscope, the characteristic clubs and filaments were detected. By staining cover-glass preparations by the method of Gram and with orange-rubin the appearances were very striking. The clubs were conspicuous on account of their great size, and were brilliantly stained.[1] In many clubs the protoplasm of the thread could be traced into the interior, as described above.[2] In one specimen prepared from the inoculated calf a thread

[1] See Plate IV, fig. 2.

[2] See Plate IV, fig. 2 *a*, *b*, *d*, *g*.

had branched dichotomously, and each branch terminated in a club, along the centre of which there was a delicate blue filament.[1] In sections of the peritoneal nodules stained by Gram's method the mycelium was demonstrated and the clubs also were stained in parts. With Plaut's method the clubs were stained as in ordinary bovine sections (Plate IV).

(*b*) *Transmission from man to rabbits.*—A small quantity of the discharge containing the yellowish grains was diffused in broth and injected with a hypodermic syringe into the abdominal cavity of a rabbit. This rabbit died seventy-nine days afterwards. On examination several nodules about the size of a millet seed were found on the peritoneum of the stomach, in the gastro-splenic omentum, and on the peritoneal surface of the diaphragm. There was a rounded nodule, about the size of a pea attached to the stomach. There were adhesions between the intestines, and a tumour about the size of a marble attached to an adhesion of the cæcum. One of the small nodules was excised and divided, and a scraping from the interior contained typical rosettes of clubs.

To the above conclusions we may, therefore, add another:

(8) The successful transmission of the disease from man to bovines suggests intercommunicability, but the negative evidence as to direct infection from the cow points to the disease originating in man and cattle from a common source.

[1] See Plate IV, fig. 2 *l*.

(For report of the discussion on this paper see 'Proceedings of the Royal Medical and Chirurgical Society,' Third Series, vol. i, p. 68.)

DESCRIPTION OF PLATES II, III, AND IV.

A Case of Actinomycosis hominis.

PLATE II.

FIG. 1.—Cover-glass preparation of fresh granule treated with glycerine.

FIG. 2.—The same material teased in water.

PLATE III.

Actinomycosis of pleura.

FIG. 1.—Growth under low power.

FIG. 2.—Same more highly magnified.

a. Central network of threads.

b. Palisade of clubs.

c. Surrounding tissue, composed of dense fibres and nucleated cells, plentifully supplied with blood-vessels. From drawings by Dr. Wynter.

FIG. 3.—After three weeks' incubation on agar-agar and glycerine. From drawing by Professor Crookshank.

PLATE IV.

FIG. 1.—Cover-glass preparation stained by method of Gram and with orange-rubin.

FIG. 2.—Cover-glass preparation from the nodules on peritoneum of calf stained by method of Gram and with orange-rubin.

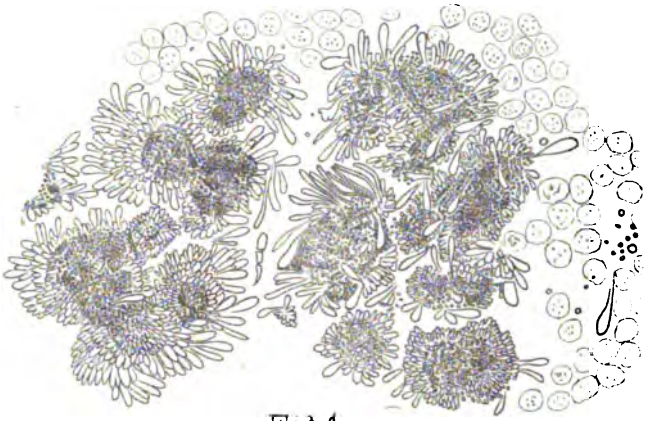


Fig 1

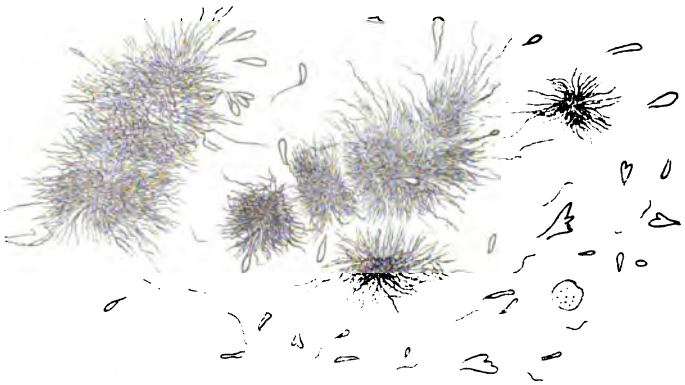
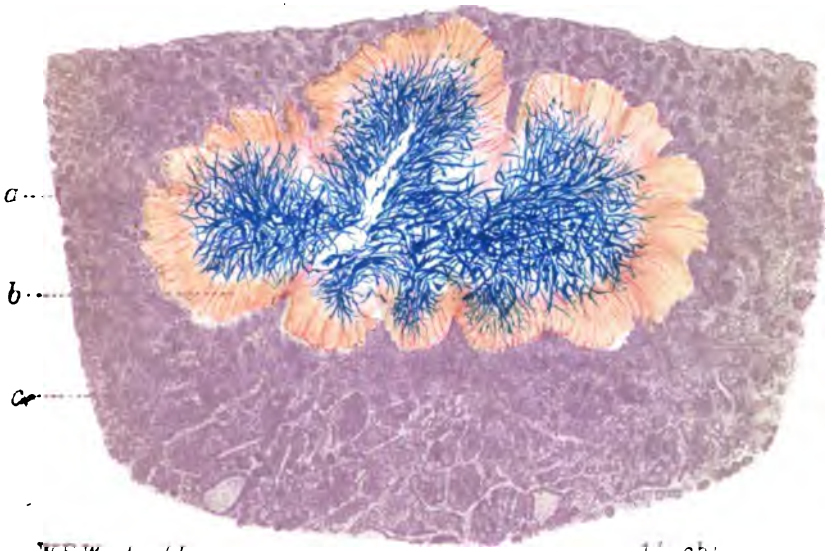


Fig 2

E. Crookshank del Danielsson & Co sculp.

Fig 1



W E Wynter, del

Fig 2

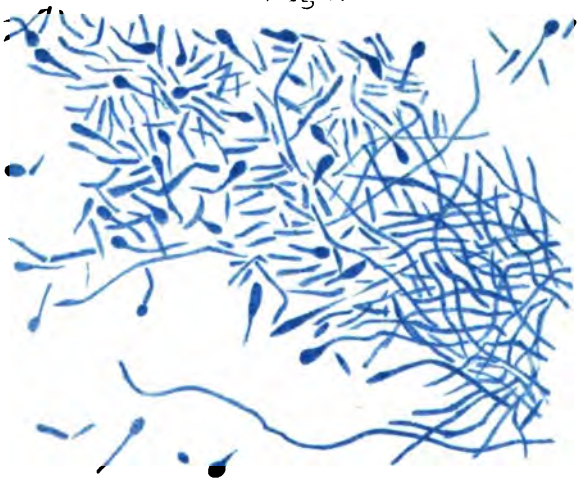


Fig 3

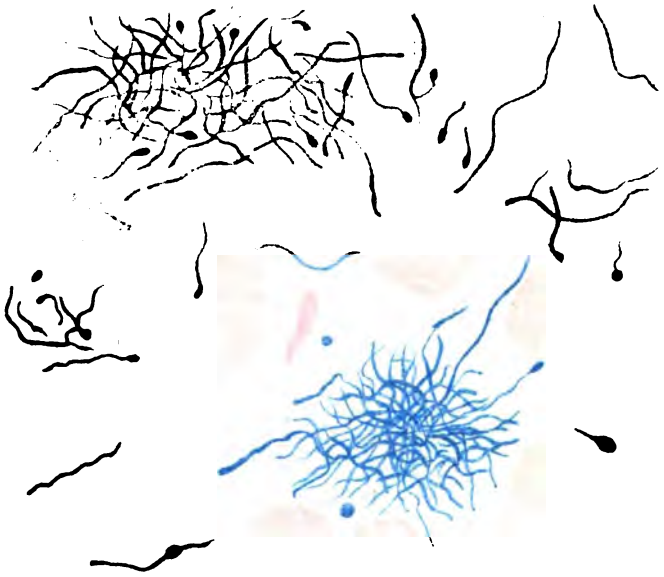


Fig. 1

Fig. 2

COLECTOMY,

OR

RESECTION OF THE LARGE INTESTINE FOR MALIGNANT DISEASE.

BY

KENDAL FRANKS, M.D.Univ.Dub., F.R.C.S.I.,
SURGEON TO THE ADELAIDE HOSPITAL, DUBLIN.

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In bringing before the Fellows of this Society the subject of colectomy for the removal of malignant disease of the large intestine, I wish to place on record the details of two cases in which I adopted this method of treatment. But while recording these cases in this paper, I consider that the hitherto small number of cases in which colectomy has been resorted to, imposes upon me the duty of shortly reviewing the subject, in order to call your attention to the present position in surgery which this operation occupies, and to invite discussion as to those details of procedure which may still be considered to be *sub-judice*.

The first case was that of a labourer, æt. 45, who was admitted to the Adelaide Hospital, Dublin, under the care of my colleague, Dr. Wallace Beatty, on February 12th, 1887. He had always been a temperate man, and enjoyed good health until about three weeks before admission. He then began to suffer from indigestion and diarrhœa, the bowels being moved eight or ten times in the twenty-

four hours. The diarrhœa was attended by pain all across the abdomen "as if a cat were tearing him." At the commencement of his illness there was some vomiting, but it was not repeated. During these three weeks the appetite became very bad, he got weaker, and his sleep was disturbed. He had had no rigors, no epistaxis, and had passed no blood in the evacuations. On admission, a swelling could be distinctly felt in the left iliac fossa, somewhat oval in shape, with its long axis directed obliquely from the left flank downwards and to the right. It measured four and three quarter inches in length, by three and a half inches in breadth. The borders were well defined and of inflammatory hardness. It was very slightly movable and was extremely tender to touch. The surface of the tumour was smooth and slightly convex. Over its left half there was dulness on percussion. The stools had the character of ordinary liquid fæces and were acid in reaction. Examination of the urine showed that there was always a small quantity of indican present. The tongue was coated with a dirty white fur; the heart-sounds were weak, but otherwise normal.

It was at first supposed that this tumour was inflammatory; and this hypothesis was borne out by a careful record of the temperature. It was found that the morning temperature varied between 99° and 100° F., while the evening temperature rose sometimes over 102° F., but in general marked 101°. Various antiphlogistic measures were adopted, without producing any result.

In the beginning of March I saw the case in consultation with Dr. Beatty. He expressed his belief that the swelling was possibly inflammatory, but feared that there was some malignant disease present. In this view I concurred. That suppuration had begun was evident on March 16th, as fluctuation was then for the first time detected, with some pitting on pressure over the surface of the tumour. We decided on operation, and this was performed under ether on the morning of March 18th, 1887. An oblique incision five inches in length was made

downwards and inwards, with its central point over the centre of the tumour. The divided tissues were found to be considerably infiltrated with inflammatory exudation, so that the various layers of the abdominal wall were indistinguishable. A small abscess cavity was first reached containing about a drachm of pus. A finger inserted into this reached a larger cavity containing broken-down material, evidently of a malignant character. As I found it impossible to recognise any peritoneum in this situation, I dissected down through the tissues at the margin of the tumour, until I reached healthy peritoneum, and this I divided all round the tumour. It was then found that the tumour, which was about the size of the closed fist, was growing from the descending colon, which it completely surrounded and to a great extent occluded. The colon was loosely ligatured both above and below the tumour in two places, and the gut was divided between each pair of ligatures, precautions having been adopted to prevent any extravasation into the abdominal cavity. The mesocolon, which was present in this case, was ligatured bit by bit and divided, and the tumour removed. The question then arose as to whether the divided ends of the gut should be sutured together and returned into the abdominal cavity, or whether an artificial anus should be established. I decided on the latter procedure, chiefly for the reasons that the operation had already occupied a considerable time and had been of a very extensive nature, and the patient, much reduced by his long illness, was in an exhausted condition. The distal end of the gut was therefore closed by turning in its edges and then suturing together the two sides of its peritoneal coat. The bowel was then replaced in its normal position. The upper end of the gut was drawn out into the external angle of the wound in the loin, and was fixed in this position by sutures, by the ordinary method. Those portions of the abdominal wall which seemed implicated in the disease were excised, and then the wound was closed. Two drainage-tubes were inserted, one on each side of the colon; the wound was

dressed and the patient removed to bed. His temperature then marked 95·5° F. At 4 p.m. it had risen to 97·3° and at 8 p.m. to 98°. He rallied well from the operation, although vomiting occurred frequently during the day. The next day he was better, but on the third day vomiting recurred and continued during that and the fourth day. On the fifth day, as there had been no evacuation, I injected some warm water gently into the bowel. This brought away some fæcal matter, but the returning fluid seemed to be merely the overflow; there was evidently no expulsive power in the colon, which was in a condition of complete atony. The abdominal wound looked perfectly aseptic.

The patient got weaker during the night, and died on the morning of the sixth day.

A post-mortem examination showed that there was no general peritonitis. There was a little lymphy exudation in the immediate neighbourhood of the upper end of the divided colon. The edges of the abdominal wound were weakly glued together with recent lymph; there was scarcely any attempt at repair. The intestines were dilated, and contained large quantities of fæcal matter. Death was evidently due to exhaustion. The tumour was a columnar-celled epithelioma.

The second case which I desire to bring before this Society shows a happier result obtained. The patient was a man, æt. 58, of very temperate habits and with a good family history, who was admitted into the Adelaide Hospital under my care on October 19th last. He had been in good health until the previous October (1887), when he had severe attacks of diarrhœa, accompanied with pain in the epigastrium, whenever he ate beef or mutton. These attacks used to last for about a day, and were followed by constipation, which sometimes continued for ten days or a fortnight. He consulted the local doctor in the West of Ireland, where he lived, but not getting better he went up to Dublin, and was under treatment there for three weeks. He improved considerably, and for three

months after his return home he had no return of the diarrhœa. The symptoms then returned. He resorted to the remedies prescribed for him in Dublin, but this time they did him no good. He was obliged to restrict his diet to gruel, potatoes, bread-and-butter, and fish. In the early part of October, a fortnight before admission to hospital, one night as he was getting into bed he noticed a hard lump in the abdomen, which "seemed to fall backwards" when he lay down. This discovery brought him back to Dublin, and he then came under my care.

He was a thin man, with a sallow cachectic aspect, which suggested the presence of malignant disease. He complained of nothing, except his inability to eat any kind of meat without bringing on attacks of pain and diarrhœa. His bowels were generally constipated. On examining the abdomen I found it soft and flaccid. There was no distension. The intestines could be felt at parts to contain some fæcal matter. There was no tenderness anywhere. As he lay on his back in bed, a very hard nodulated tumour, about the size apparently of a large orange, could be distinctly felt in the middle line, just below the umbilicus. It could be manipulated, and even firmly pressed without giving rise to any pain. The most remarkable thing about it was its extreme mobility. It could be pressed upwards into the epigastrium, or up to the ribs on either side. It could be made to occupy either renal region, and in this situation on the left side could be most distinctly outlined. It could be moved downwards nearer to the pubis, but in this direction its freedom of movement seemed more limited.

All the organs of the body seemed healthy, and the urine was normal. I kept him under observation for ten days, during which time he was examined carefully by all my colleagues. The weight of evidence seemed in favour of a tumour of the omentum, probably sarcomatous, and its extreme mobility seemed to augur an easy removal. Operation was decided on, and, assisted by my colleagues, I performed it on October 30th last. Although

I believed I had to deal with an omental tumour, still I suspected that the intestine might at some part of its course be more or less involved, and this suspicion was originated by the intestinal symptoms to which I have already referred, and which had existed for nearly twelve months. Acting on this suspicion, before proceeding to operate I had very fine silk (Chinese twist) and some intestinal needles in readiness in a solution of carbolic acid. On the night of October 29th the patient was given a dose of castor-oil, and the following morning an enema was administered, which acted well. When he was completely under the influence of ether, the abdomen well cleaned with soap and water and disinfected with corrosive sublimate, an incision about four inches long was made in the linea alba from the umbilicus downwards. The peritoneum was rapidly reached and opened to the same extent. The tumour was no longer to be felt in the middle line, so I was obliged to pass in my hand and search for it. I found it in the hepatic region, and drew it downwards till it was completely outside of the abdominal cavity. It was then found to be a malignant growth involving the transverse colon, near its hepatic flexure, and was when freshly removed about the size of a closed fist. The omentum, which was extremely small and contained little fat, was implicated in the neighbourhood of the colon, and some enlarged and hardened glands, not larger than very small beans, could be felt between the layers of the transverse mesocolon. Removal of the tumour thus involved resection of a portion of the transverse colon, which ran through the middle of it. Before beginning this portion of the operation the abdominal cavity was protected by placing two large flat sponges between the abdominal wound and the tumour, one on each side, and clipping their edges together with Wells' forceps so as to completely encircle the base of the growth, and to prevent any danger of their slipping. The colon on each side of the tumour was then encircled by a piece of catgut about two inches from the growth, and each of these was tied

just tight enough to occlude the bowel without interfering with its vitality. The bowel on each side was then divided with scissors. The great omentum, which in this case was reduced to a mere connecting band between the stomach and colon, was then tied, bit by bit, close up to the stomach on one side and to the tumour on the other, and divided between them. Then I had to deal with the transverse mesocolon; which was tied in a similar manner; but in this case, as the disease had spread into it to a small extent, and several glands were involved, in removing all these diseased parts a wedge-shaped piece was of necessity removed from the transverse mesocolon. The entire tumour was thus freed and removed.

The question then arose as to what should be the subsequent treatment of the divided ends of the gut. I resolved to attempt immediate union of the ends by suture, in preference to making an artificial anus. The patient had not hitherto suffered much from the operation. He was breathing well, and his pulse was very good. I therefore considered that he would run no greater risk by suturing the intestine at once than he would by being exposed to a second operation, at a later period, of intestinal suture for the cure of an artificial anus. Moreover, the situation of an artificial anus in the middle line near the umbilicus is not a place one would choose on its merits. I proceeded, therefore, at once with the suture. The sides of the triangular cutting in the mesocolon were first approximated by means of several points of interrupted suture, catgut being employed. The ends of the colon being then approximated, the edges were inverted. No sutures were used in the mucous coat, but the peritoneal coats were sutured together by means of fine silk passed through the peritoneal and muscular coats alone. These sutures were passed in the manner recommended by Gély, that is to say, the suture was armed with a fine needle at each end, and these were passed in the transverse direction to the long axis of the bowel. Each suture took up not more than a quarter of an inch of the intestine, and

they were passed about half an inch from the divided end of the gut. As each of these sutures were tied, they pressed together the sides of the serous coat not only at the points of entrance and exit of the needle, as is the case in Lembert's method of suture, but the intervening spaces between the sutures also. Thus the entire circumference of one end of the bowel is compressed against the entire circumference of the other end, and it seems to me that there must therefore be less chance of leakage than when Lembert's method is adopted. It should be observed that the suture is a continuous one, interrupted at each point of emergence by a knot.

As soon as the suture was completed the intestine was returned into the abdominal cavity after being carefully cleansed. A quantity of boracic acid solution at blood heat was poured into the peritoneal cavity to clean it, and allowed to pour out by turning the patient on his side. The remainder was carefully sponged out. The peritoneal edges in the abdominal wound were then sutured together, the edges being everted, and the rest of the wound was approximated by interrupted catgut sutures. Antiseptic dressings were applied, and the patient was removed to bed. The operation occupied two hours.

Shortly after the operation a hypodermic injection of one sixth of a grain of morphia was administered. He gradually rallied from the operation, and in three hours and a half had recovered from the ether. Small quantities of brandy and iced water were frequently administered. Four hours after operation one sixth of a grain of morphia was again given hypodermically, after which he slept quietly for two hours. The temperature at 9 p.m. was 100·6°, pulse 100 and fairly strong.

Next morning the temperature was 99°, pulse 98. Ice and brandy (four ounces in the twenty-four hours) were alone allowed by the mouth, and he was ordered a zyminised suppository every sixth hour.

On the morning of the third day matters did not look so promising; I found him very drowsy, not answering

questions, and making no attempt to put out his tongue when told to do so. His breathing was stertorous, his pupils contracted, the pulse 136 and small, and the temperature 102°. The abdomen, however, was soft and undistended, the wound looked perfectly aseptic. There were no local evidences of peritonitis. I could not account for the rise of temperature, unless it was due to the traumatism, but the drowsy condition of the patient, the stertor, and other symptoms made me inquire closely as to the amount of morphia which had been administered, and I ascertained that it had been continued beyond the limit which I had intended, by some misunderstanding as to the directions given. Whether, however, his condition was really due to an excess of the narcotic I have not been able to satisfy myself. He was ordered half a teaspoonful of Brand's essence with an equal quantity of brandy every six hours, and half way between each of these a nutrient suppository. Four grains of quinine were also given in a little milk every six hours. In the evening the pulse was 130, the temperature 101·8°, but he was not quite so drowsy. Next morning matters had considerably improved, the temperature 99·4°, pulse 96, much clearer. Same treatment continued unchanged.

On November 4th, that is the sixth day, there was in the evening a very copious discharge from the bowels, which almost filled the bed-pan. He seemed greatly relieved after it.

On the seventh day there were two motions, and after the ninth day the bowels moved regularly. On the ninth day the first solid food was allowed, in the shape of some chicken.

His progress henceforward was uninterrupted, and at the time of writing this paper, more than a month afterwards, the patient is walking about without any discomfort, and has rapidly put on flesh. There is as yet no sign of recurrence.

A microscopical examination of the growth shows that it is a typical columnar-celled epithelioma.

I have collected together in tabular form all the cases of colectomy for malignant disease hitherto reported which I have been able to find. The total number is fifty-one, and although this number is small, still it affords a provisional basis upon which we can form some opinion as to the value of the operation as a curative agent or as a palliative measure, and also as to its danger and consequently as to the justifiableness of the procedure.

In two of the cases I have not been able to ascertain whether the patient recovered or died, but in forty-nine cases the result is recorded. Of these I find that twenty died as a result of the operation, during a period varying from half an hour (Case 40) to thirteen days (Case 34). This gives a mortality of 40·8 per cent. By recoveries here, I mean those cases which did not die as a result of operation. Such recoveries amount, therefore, to 59·2 per cent. (twenty-nine cases).

Of these twenty-nine cases, no subsequent history is reported in nine cases,[1] but in twenty the result has been traced for a longer or shorter time. In ten cases recurrence or the death of the patient is reported. One case (17) recurred in a month, one in six months (31), death occurring in nine months; one in six months (1), death in a year; and one recurred in a year (15). Death is reported at the end of nine weeks (45), six months (9), seven months eleven days (11), one year (23), a year and a half (22), and a year and ten months (14). No recurrence was observed at the last occasion of examining the patient in ten cases; in one case after two months (51), in two cases after two and a half months (16 and 38), one after four months (43), two after five months (42 and 46), one after six months (39), one after nine months (25), one after ten months (29), and one after four years (6). In these last ten cases there is only one of which we can speak as a real cure, namely, Gussenbauer's (6), in which four inches of the sigmoid flexure, with its mesocolon, was removed for

[1] Cases 12, 20, 30, 33, 35, 41, 44, 47, and 48.

carcinoma, and in which, at the end of four years, there was no return of the disease.

Looking, then, at colectomy for malignant disease as a curative agent, we must confess that hitherto it has failed, even in a more marked way than operations for malignant disease in other parts of the body. But it is far otherwise when we look upon it as a means of affording relief to the sufferer. There are few forms of death in which the end is reached by a more painfully distressing road than by that which accompanies malignant stricture of the large bowel. I doubt even if death from starvation in malignant disease of the beginning of the digestive tube is as bad as the death from distension, when the lower portion of the tube is blocked. An operation which will remove the terrors of death, even though it may not ensure subsequent immunity, is justifiable; nay, it is more, it is demanded of the surgeon. In the cases which recovered and which were subsequently traced, even those in which it was known that recurrence had taken place, I doubt if in one of them death had been accelerated. In most of them undoubtedly life had been prolonged. And it is to be borne in mind that if in colectomy sufficient of the bowel is resected to cut wide of the disease, when recurrence takes place the disease reappears most frequently in the mesenteric glands or in the liver, and obstruction of the bowels is avoided. The mortality following the operation is no doubt formidable, and the patient must have the risks of the operation as well as its advantages placed clearly before him; but at the same time I believe that we shall have better statistics of the operation in the future than we have to-day. In the first thirty-three cases tabulated by Weir, the mortality is 51·5 per cent., but the added cases which I have collected have reduced the total mortality to 40·8 per cent. And these cases are collected from all countries and from the hands of all operators. The list includes cases which most surgeons, certainly in this country, would have hesitated to submit to operation, and which scarcely should be included in a statistical

table the object of which is to determine the exact truth as to the danger or otherwise of a legitimate colectomy. In the Table is to be found the record of a man aged fifty-seven, upon whom the operation was performed which is thus summarised: "Resection of small intestine, of transverse colon, then of the pylorus and of the superior horizontal part of the duodenum." The operation lasted five hours, and the patient died half an hour after it was completed!

There is another question upon which I would like to offer some remarks, and that is as to the relative advantage of immediate suture of the intestine over the temporary formation of an artificial anus, with the prospect of subsequently operating by suture to close the opening, although this secondary operation seems only to have been performed in one case by Maydl (23), and one attempt was made by J. M. Barton (46) to restore the calibre of the intestine by means of Dupuytren's enterotome, which was partly successful, a fæcal fistula remaining.

The statistics shown by the Table of Colectomies give us little assistance in the matter. Five of the cases give no information (12, 16, 24, 44, and 49). In one case (18) suture was peformed, but the result is not stated. In the remaining forty-five cases the intestinal ends were sutured together and returned to the abdominal cavity in twenty-six, and an artificial anus was formed in nineteen. Of the twenty-six cases of suture fifteen recovered, that is about 57·7 per cent. of recoveries. Of the nineteen cases of artificial anus eleven recovered, which gives a percentage of 57·9. These results are so nearly equal that they teach us little as to the relative merits of the two procedures, but they do teach us this, that in the main the death-rate is due either to the conditions which necessitated colectomy or to the operation itself, and that the employment of either the method of suture of the divided ends or the formation of an artificial anus does not materially influence the result. But beyond these considerations there is much to be said in favour of the immediate suture,

carefully performed. It is a great advantage to be able to live without an artificial anus. Even if it is proposed subsequently to close the artificial anus by a fresh resection and suture, as in Maydl's case, this entails a second operation on the patient, which cannot be altogether devoid of risk, so that, unless subsequent increase of experience proves that the immediate suture is more dangerous to the patient than the alternative artificial anus, I should be strongly inclined in any future cases to adopt the more convenient and more æsthetic method of intestinal suture at the time of the colectomy.

The patient (Case 2 in this paper) was reported to be "in better health than he has been for years," without any digestive troubles, and with no sign of recurrence of the disease in June, 1889, *i.e.* eight months after operation.

(For report of the discussion on this paper, see 'Proceedings of the Royal Medical and Chirurgical Society,' Third Series, vol. i, p. 74.)

Table of Cases of Colectomy for Malignant Disease hitherto published.

No.	Operator and date.	Disease.	Length removed.	Treatment of resected intestine.	Situation, &c., of abdominal wound.	Result.	Where reported.
1	Reybard. 1843	Carcinoma of the sigmoid flexure	3 inches	Sutured and returned	Six inches long above crest of ilium. Wound united by 3 sutures	Recovery; 10th day movement from bowels. Recurrence 6 months later, and death 1 year after operation	Bull. Acad. de Mid., t. ix, p. 1033.
2	Thiersch. 1875	Carcinoma; acute obstruction	Not stated	Lembert's suture, intestine united and returned	Linea alba	Died in 12 hours. Septic peritonitis	Deutsche Gesellsch. f. Chir., 1878, Bd. vii, S. 127.
3	Gussenbauer. Dec. 6th, 1877. Man	Carcinoma of colon; adherent also to small intestine; acute obstruction	3 inches	Ends united by Lembert and Gussenbauer suture; wound accidentally made in small intestine closed by 3 sutures	Linea alba, and a second one transverse to this	Died 15 hours after operation from collapse	Archiv f. klin. Chirurg., 1878, Bd. xxiii, S. 233.
4	Schede	Carcinoma of descending colon extensive. Intestine cut off	None removed. Disease found too	Ends sutured to wound as they could not be approximated	Over tumour on left side	Died in 24 hours from inanition; no peritonitis	Deutsche Gesellsch. f. Chir., 1878, S. 126.
5	Billroth. 1879. Woman, 60	Carcinoma of descending colon at transverse flexure	Not stated	Enormous distension of bowels; artificial anus made as it was impossible to unite ends—not stated why. Lower end closed and left in. To replace intestines, incisions made to let out flatus, which were afterwards sewn up	—	Died in 24 hours	Hauer Zeitschf. Heilkunde, 1884, S. 83.
6	Gussenbauer and Martini. Nov. 9th, 1879	Carcinoma of sigmoid flexure and mesocolon	4 inches	Lower end turned in on itself; sutured and returned to pelvis. Upper end made an artificial	Over tumour in left side of abdomen	Recovered; in 2 months resumed work. Reported by Schede in 1883 as still free from	Petit. Bull. Gén. de Thérap., t. ciii, 486, from Zeitschr.

				anus in superior end of wound		disease	für Heilkunde, Bd. i, S. 208
7	Guyon. Nov. 23rd, 1879	Cylindrical epithelioma at juncture sigmoid flexure and rectum	2½ inches	Ends united by 15 sutures and bowel replaced	Linea alba	Movements followed immediately; died in 3½ hours	Petit. Bull. Gén. de Thérap., t. cii, 537, from Peyrot, De l'intervention chirurgicale dans les obstructions de l'intestines.
8	Baum. Jan. 13th, 1879	Carcinoma of ascending colon. Fæcal fistula made 8 weeks before operation above Poupart's lig. on right side in small intestine to allow escape of gas, which prevented use of percussion and palpation	8 inches	End of upper intestine being longer than that of the lower end, the former was made smaller after Billroth and Czerny's method, a wedge-shaped piece directed outward being made by 6 stitches. Ends then united with carbolised silk, Gussenbauer's sutures. Gut returned	Incision 3 inches long over tumour, 1 inch below ribs, 3 inches to right of median line. Supplementary incision 4 inches long from middle of first running to right. Wound united with silk	Fifth day soft movement; died 9th day. No peritonitis; sutures gave way	Centralblatt für Chirurg., 1878, vol. vi, p. 169.
9	Kraussold	Carcinoma sigmoid flexure	Not stated	Sutured	—	Recovered, died 6 months later of recurrence in mesentery	Sammlung Klin. Vorträge, 191, S. 1724.
10	Kraussold. April, 1879	Carcinoma ileo-cæcal valve, cæcum, and vermiform process	—	Joined by Lembert's sutures, silk	As for ligation right external iliac	Died of shock in 2 hours	Centralblatt für Chirurg., 1881, vol. viii, p. 186
11	Czerny. 1880	Carcinoma of transverse colon and sigmoid flexure	3 inches of sigmoid flexure and 4½ inches of transverse colon	Cut ends of sigmoid united by 33 sutures, colon by 26	4½ inches long over tumour in left hypochondrium. United by deep and superficial sutures. Drainage	Recovered; movement 10th day after injection. Abdominal wound opened, and healed in 4 months, but recurrence began, and patient died at end of 7 months 11 days	Petit, from Berl. klin. Wochenschrift, 1880, 638.

No.	Operator and date.	Disease.	Length removed.	Treatment of resected intestine.	Situation, &c., of abdominal wound.	Result.	Where reported.
12	Credé. 1880. Incomplete operation	Carcinoma of intestine	—	Only a portion of tumour removed for microscopic examination. It was found to have many foci	—	Recovered	Archiv. f. klin. Chir., Bd. xx, S. 293.
13	Wittelshoefer (Billroth). July 1st, 1880	Carcinoma of sigmoid flexure	9 inches	Lower turned in and sutured, upper sutured to upper end of wound	To left of median line with convexity external. Sutured from below up to artificial anus	Died in 14 hours from general peritonitis and endocarditis	Wiener med. Woch., 1881, S. 1885.
14	Fischer. Feb. 24th, 1881	Carcinoma of descending colon	Nearly 3 inches	United by Czerny's suture and then fixed by a suture in lower end of abdominal wound	Linea alba, upper ¾ closed, lower ¼ left open	Movement 1 hour after operation from rectum; 8th day fæces came from abdominal wound and fecal fistula formed there. Patient discharged on Oct. 19th (8 months after operation) cured, with no sinus. Died Jan. 9th, 1883	Deutsche Zeitsch. für Chir., 1884, No. 19 p. 251; Centralblatt für Chirurg., 1881, Bd. viii, S. 794.
15	Bryant. Sept. 10th, 1881	Alveolar carcinoma of descending colon	About 4 inches	Upper end made into artificial anus; lower closed, and sewed to lower end of wound	For left lumbar colotomy; stricture found above wound thus made pulled down and excised; lower part closed; upper made into artificial anus	Recovery; movements during operation. Aug., 1882, doing well; there had appeared recurrence at opening one year later which demanded stretching	Medico-Chir. Trans., vol. lxv, p. 131.
16	Nicholaysen, March 1st, 1881. Woman, 49	Carcinoma, sigmoid flexure prolapsed beyond anus	—	While protruding beyond anus it was removed with its mesentery	Removed per rectum	Recovery; 2½ months later reported well	Nord. med. Ark., iv, No. 13, 1882; Centralb. f. Chir., No. 36, 1882.

17	Von Wahl. 1882 (?). Woman, 26	Colon adherent to cancer of ovary and infiltrated with neoplasm	4 inches	Colon sutured together; Gussenbauer, Lembert; clamp to hold end intestine	—	Recovery, though recurrence took place in a month	London Med. Record, April 15th, 1883.
18	Bergmann. 1882. Man, 40—50	Carcinoma cæcum	?	Cæcum and small intestine sutured together	Median incision	?	Oral communication from Dr. E. M. Culver, who witnessed the operation.
19	Billroth. Aug. 20th, 1881. Man, 56	Carcinoma cæcum	Cæcum and part of ileum	Colon reduced in size by 11 "occlusive" sutures, and then united to small intestine by 11 Wölfler and 19 Lembert sutures	From umbilicus to middle of Poupart's ligament	Sixth day stercoraceous vomiting; wound opened; cause not found; artificial anus then made. Died—no autopsy	Hauer, Zeitschr. f. Heilkunde, 1884, S. 83
20	Billroth., Oct. 18th, 1881. Woman, 29	Carcinoma both ovaries, involving intestine and bladder, both of which were resected	5 inches	Ends united by 5 Wölfler and 9 Lembert sutures and replaced. Gut held by assistants	Median line	Recovered; bowels moved on 10th day	Do.
21	Marshall. April 15th, 1882	Carcinoma descending colon	3½ inches	Lower end cleaned with sol. zinc chloride, and sutured to skin wound by silk sutures through serous and muscular layers, and gut sutures through all coats; lower end ligated with gut and fastened in wound	Wound in median line closed with silk; lateral wound made, artificial anus; first incision made in median line just below umbilicus to pubes; supplementary incision 3 inches long parallel to last rib of left side, 1½ inches above crest of ilium	Movement during operation. Died 3rd day. Diffuse suppuration	Lancet, 1882, p. 721.

No.	Operator and date.	Disease.	Length removed.	Treatment of resected intestine.	Situation, &c., of abdominal wound.	Result.	Where reported.
22	Volkmann	Carcinoma upper part sigmoid flexure	4 inches	Artificial anus made; both ends brought into wound	?	Recovery; reported in 1884 as dead from a recurrence of cancer 1½ years after operation	Centralb. f. Chir., No. 10, 1883
23	Maydl. April 1st, 1883. Man, 54	Cancer cæcum	Cæcum and small intestine removed, 7 inches in all	Artificial anus made, and six months later closed by re-uniting intestine after a further resection of two inches	Outside of rectus; drainage after resection of fecal fistula, which slowly contracted but did not heal	Recovered; since dead from recurrence 1 year later	Wiener med. Presse, April, 1883.
24	Czerny	Carcinoma cæcum and part of duodenum	—	—	—	Died	Centralb. f. Chir., No. 30, 1883.
25	Schede. June, 1883. Man, 50	Carcinoma of small intestine attached to abdominal walls, tumour size of man's fist	8 inches, mesenteric glands also removed	Temporary ligature, ends united by single row of mucous, and double row of serous sutures, all continuous and of sublimated catgut	Median laparotomy	Recovered, movement from 1st day; 9 months later intestinal obstruction from a band; laparotomy; death; no recurrence found	Beilage zum Centralb. f. Chir., 1883, p. 66.
26	Partsch. July 14th, 1883	Carcinoma of small intestine	3½ inches	Sutured with silk passing through serous and muscular coats to middle of wound; ligature left about lower end of gut when stitched to wound	From umbilicus to symphysis closed, except for 2 inches in centre, where peritoneum was sutured to edge of wound, and both ends of gut were secured	During operation, movements carefully kept from abdominal cavity; doing well on 4th day, except delirium, in which patient jumped out of bed and tried to escape; death 5th day, exhaustion	Centralb. für Chir., 1883, No. 52, S. 833.
27	Lammiman. Feb. 14th, 1883	Scirrhous carcinoma of descending colon	Not stated	Upper end sutured to wound; lower end ligated with carbolised silk; gut returned to cavity	As for left lumbar colotomy; closed to artificial anus	Died in 48 hours from exhaustion; movement in a few hours	Lancet, Aug. 4th, 1883, p. 182.

28	Treves	Cylindrical epithelioma of descending colon	Not stated	Ends united by 25 Lembert's sutures, not including serous membranes; Chinese twist silk divides mesentery from the gut	Median line	Died in 12 hours without stool from shock and exhaustion	Med.-Chir. Trans., 1883, vol. lxvi, p. 55.
29	Billroth. Jan. 28th, 1883. Woman, 56	Colloid carcinoma of transverse colon	6 inches	9 inner and 27 Lembert sutures; tumour adherent to anterior abdominal wall	Drain used	7th day fæcal fistula developed, which closed on 14th day; recovered; reported herself well 10 months later	Hauer, Zeitschr. f. Heilkunde, 1883, S. 83.
30	Billroth. March 23rd, 1884. Man, 55	Carcinoma of cæcum, size of apple	2¾ inches of colon, 1¼ inches small intestine excised, after tying intestine temporarily with broad strips of iodoform gauze	Ends joined with 22 sutures	6 inches long, just outside right linea alba; drain used for 5 days	Recovered; 6th day bowels moved	Do.
31	J. K. Barton. Dec. 17th, 1883. Man, 25	Sarcoma enveloping sigmoid flexure of colon and attached to bladder	—	Upper end of bowel sutured into upper angle of wound; lower end ligatured and ligature brought out at lower angle of wound; tumour dissected from bladder; artificial anus	4 inches median	Recovery; 6 months later disease returned; death in 9 months	Supplied to author by operator.
32	Sydney Jones. May 23rd, 1884	Scirrhous carcinoma of ascending and transverse colon	Not stated	14 silk sutures through whole thickness of gut joining ends; "others" through serous coat alone, one fastening serous coat to abdominal wall	Over tumour 5 inches; vertical direction; closed, except in centre; here packed with gauze (iodoform)	Died 3rd day; no movement; exhaustion; no peritonitis, but "dirty-looking pus had infiltrated tissues" at juncture of mesentery and gut	Lancet, Jan. 10th, 1885, p. 60.
33	v. Bergmann. 1884	Cancer of descending colon and sigmoid flexure	—	Sigmoid flexure and part of descending colon excised; artificial anus; 4 weeks later, 1 foot of gangrenous intestine discharged	—	Recovery with artificial anus	Deutsch. med. Wochenschr., No. 24, 1888.

No.	Operator and date.	Disease.	Length removed.	Treatment of resected intestine.	Situation, &c., of abdominal wound.	Result.	Where reported.
34	W. Whitehead. Oct., 1884. Man, 38	Carcinoma of ascending colon, involving the cæcum	14 inches	Ileum sutured to lower angle of wound; colon to upper angle; artificial anus	Outer border of rectus	Death 13th day; acute peritonitis	British Medical Journal, Jan. 24th, 1885, p. 171.
35	Hofmokl. April, 1885. Woman, 24	Malignant adeno-sarcoma of cæcum	9½ inches	Ends secured with 3 rows sutures; drained	Curved 5 inches from rectus, exposing tumour	Recovery; movements 5th day	Anzeige der k. k. Gesellschaft der Aertz in Wien, May 1st, 1885.
36	Lange. 1885	Carcinoma of flexure and ascending colon	4 inches	Ends united with difficulty; duodenum wounded and sewn up	—	Died 2nd day	Oral communication, Annals of Surgery, 1886, vol. iii, p. 481.
37	Lange. 1885. Woman, 32	Sarcoma of transverse colon, with sarcoma of both ovaries	6 inches	Ends sutured by Czerny-Lembert method	Median	Died 9th day from perforative peritonitis, diarrhœa persisting from time of operation	Do.
38	Weir. Oct. 22nd, 1885. Man, 54	Carcinoma of sigmoid flexure, lower end	5½ inches	Temporary ligatures; artificial anus made; rectal end closed	4 inches; median	Recovery; left hospital Jan. 3rd, 1886, gaining flesh and strength; recurrence probable	Annals of Surgery, 1886, vol. iii, p. 469.
39	v. Bergmann, Man, 35	Malignant tumour size of fist, of lower end of ileum and of the cæcum	—	Resection with primary intestinal suture	—	Recovery; no return 6 months later	Virchow and Hirsch, Jahresbericht Ges. Med., 1885, ii, 406.
40	v. Bergmann. Man, 57	Malignant disease	—	Resection of small intestine, of transverse colon, then of the pylorus and of the superior horizontal part of the duodenum; suture	—	Death half hour after operation, which lasted 5 hours	Do.

41	E. Hahn. Aug. 12th, 1886. Man, 19	Small-celled round-celled sarcoma of the ileum involving the cæcum	—	Cæcum and part of ileum excised; artificial anus	At border of sacro-lumbalis muscle, from 12th rib to crest of ilium; from the middle of this, transverse incision 3 inches outwards	Recovery with artificial anus	Berl. klin. Wochenschrift, June 20th, 1887.
42	B. Pitts. Nov. 22nd, 1886. Woman, 37	Columnar-celled epithelioma of splenic flexure of colon; acute obstruction	4½ inches	Intestine sutured three fourths round; anterior fourth sutured to external opening, forming artificial anus; preliminary colotomy 2 months previously	Oblique incision below left ribs	Recovery with artificial anus; 5 months later in perfect health	British Medical Journal, April 30th, 1887, p. 936.
43	A. Alsberg. March 24th, 1887. Woman, 53	Retro-peritoneal lipoma weighing 34 lbs., in removing which transverse colon ripped up	18 centimetres	Joined by 26 sutures; Czerny's method	Median	Recovery; fæces evacuated on 6th day; 4 months later patient quite well	Deutsch. med. Wochenschrift, 1887, xiii, 994.
44	E. Küster. June 15th, 1887. Woman, 22	Colloid carcinoma of transverse colon, attached to stomach, which was drawn down in to left iliac fossa	—	—	2 centimetres from ant. sup. spine, curved inwards and downwards	Recovery	Berl. klin. Wochenschrift, July 11th, 1887, p. 517.
45	J. Eastman. Sept. 27th, 1887. Woman, 20	Cylindrical epithelioma of descending colon; right ovary removed for fibroid change	8 inches	Lembert's sutures, ¼ inch apart; tested by Bergeon's method of rectal distension with H_2S	Median	Recovery; death 9 weeks later from return of disease in pedicle of right ovary; intestine sound	Journ. Americ. Med. Assoc., 1887, ix, p. 833.
46	J. M. Barton. Nov. 1st, 1887. Woman, 38	Epithelioma of ilio-cæcal valve	3 inches	Temporary artificial anus; subsequent use of Dupuytren's enterotome	Incision, 3 inches in length, parallel to median line, 1 inch outside middle of Poupart's ligament	Recovery; 5 months later, well; but still fæcal fistula	Journ. Americ. Med. Assoc., 1888, x, 549.

No.	Operator and date.	Disease.	Length removed.	Treatment of resected intestine.	Situation, &c., of abdominal wound.	Result.	Where reported.
47	Hofmokl. Nov. 14th, 1887. Woman, 29	Adeno-carcinoma of ascending colon, involving cæcum	—	Sutured with silk in three rows	20 centimetres long from lower ribs behind, forward and downward to near Poupart's ligament	Recovery; bowels moved on 4th day; patient up and about 8th week	Wiener med. Presse, 1888, xxix, 321—357.
48	Penrose. Feb. 1st, 1888	Cancerous mass, 12 inches long, involving descending colon and mesocolon; complete obstruction	At least 12 inches	Partial suture of ends of divided gut together; rest sutured to skin wound; artificial anus	Abdominal incision 4 inches long	Reported going on well on 8th day	Medical and Surgical Reporter, Philadelphia, 1888, lviii, 273.
49	A. Inversen. 1888	Tumour of the sigmoid flexure with intestino-vesical fistula	—	Resection of sigmoid flexure and descending colon, with resection of part of the bladder	—	—	Gynæk. og. obst. Medd. Kjøbenh., 1888, vii, 169—175.
50	Kendal Franks. March 19th, 1887. Man, 45	Cylindrical epithelioma of descending colon, involving parietes; almost complete occlusion	About 6 inches	Lower end inverted and sutured; upper end brought out at upper angle of wound forming artificial anus	Oblique incision, centre over tumour; 5 inches long from tip of 12th rib, downward and forward	Death on 6th day from exhaustion	Present communication.
51	Kendal Franks. Oct. 30th, 1888. Man, 58	Cylindrical epithelioma of transverse colon, size of fist; partial occlusion	5 inches	Primary suture of intestine—one row of sutures; Gély's method	Median; umbilicus to pubis	Recovery; bowels moved copiously 5th day; quite well 9 months later	Present communication.

PEMPHIGUS VEGETANS (NEUMANN).

BY

H. RADCLIFFE CROCKER, M.D.

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The case I am about to relate is the first recognised instance in England. There are, however, at least two other English cases on record, but their nature was not fully appreciated, owing to Neumann's observations not having been promulgated in this country.

As most of the known cases are from German sources, I propose, in addition to my own case, to give an abstract of all the cases related by Neumann and others which I have been able to find, and a general outline of the subject, so far as our present knowledge enables us to go.

Neumann was not the first to relate cases of this disease; Hebra and Kaposi had already described cases as vegetating syphilides, and Auspitz had met with two cases, and recorded them as herpes vegetans. Neumann, however, was the first to recognise the relation of the affection to pemphigus, and drew up such a clear and distinct account of it, that no one can have any further difficulty in avoiding the mistake of treating it for syphilis, which has generally happened.

Emma H—, æt. 43, was admitted into University College Hospital on June 18th, 1887. There was nothing of interest in her family history. Until attacked by the present disease she had never suffered from any illness which laid her up. There was some reason to think that she was not strictly temperate. On April 9th, 1887, she went to Dr. Phillips, of the Southgate Road, who kindly informed me that she then complained of great weakness and stomatitis. Nine days later, the first bulla appeared on the abdomen; others soon followed, and from the first, each bulla, instead of healing, left an ulcer at its site. From the abdomen, the eruption spread to the thighs, back, and, indeed, all over the body, the groins and axillæ being especially involved. Large doses of quinine, with and without arsenic, were given, but with no good effect, and opium, which was also tried, seemed to act prejudicially on her appetite and general condition.

On June 19th, the day after admission, the following notes were taken: The patient is a fairly well-nourished woman, with grey eyes and dark complexion. The upper lip has a single scabbed patch; the lower is thickly scabbed and dry; the rest of the face is clear. Inside the mouth the tongue is white almost all over from loosening of the epidermis; there are excoriated patches on the soft palate. The inside of the cheeks and lips are nearly denuded of epithelium, but in spite of this condition of mouth she can eat meat without much discomfort, but nothing dry or hard. The scalp is nearly covered with yellowish fatty crusts, and has an offensive smell. On the occiput is an irregular excoriated patch with unhealthy-looking edges, but there are no bullæ, and she says they began as scabs. On the neck are several excoriated patches, and where the folds of skin are in contact there is a thick white secretion. Round the excoriations, which are the site of previous bullæ, are numerous small vesicles and bullæ which are not very tense, and contain a cloudy fluid. Just above the left breast is a brown, slightly scabbed patch, two and a half by one and a half inches in area, which is a superficial ulcer in process of healing. On the right breast is a more recent patch, in

which the epidermis has been evidently raised up, but the covering is still there. The rest of the chest is quite clear. The left axilla is entirely occupied by a papillomatous, irregularly projecting mass, raised about a third of an inch above the surface. The lower half is dry, and covered with a brown crust, broken up into irregular masses by deep furrows; the upper half, where the surfaces are in contact, is covered with a white secretion with a penetrating nauseous odour like that of the scalp. In the right axilla is a similar condition, but the mass is not quite so prominent. In the arms, the left upper third is nearly clear, but near the axillæ two bullæ have just appeared, half an inch in diameter, with perfectly clear contents. Near the elbow, both front and back, the whole circumference is covered with more or less perfect bullæ and scaly crusts, and over the internal condyle is a superficial ulcer three quarters of an inch in diameter, with raised edges and red smooth surface which is now dry. The right arm is more affected, and has several fresh bullæ; over the biceps is a patch two inches square of bullæ both old and new, together with scaly crusts. Underneath the arm, continuous with the papillomatous part in the axillæ, is a large excoriated patch partly covered with epidermis. At the back of the arm near the elbow, is a raw surface about four inches by two and a half, and at the flexure is another; both are bright red, moist, and secreting serum only. Just above the flexure is a large crusted patch adjoining the raw surface at the flexure, the crust being mainly epidermic. On the left forearm, is a nearly free triangular surface over the ulna, extending about an inch and a half each side nearly to the wrist, where it ends in a point. All the rest is covered with not quite tense bullæ with opaque contents, except at the wrist, where there is an excoriated but dry surface. The right forearm is affected similarly to the left both in distribution and character, but is nowhere denuded of skin. On the extensor aspect of both wrists the bullæ are so crowded as almost to touch. The backs of both hands as far as the first interphalangeal joint are uni-

formly covered with thick epidermic crusts, and here and there, even beyond these limits, are signs of past bullæ, but the nails are unaffected. In the centre of both palms the epidermis is irregularly raised and dry, from the formation of imperfect bullæ, but the hands are not so bad as they have been. Over the arms and hands the disease as a whole is very symmetrical in its distribution. On the abdomen, large nearly continuous patches extend almost across it and upwards to just above and including the umbilicus. At the sides they are confluent, and at the centre, one patch is three inches across, with some brown stains round it, and an area of clear skin of only one inch across separates the centre and side patches. These patches are covered with brown, irregular, warty-like, crusted masses of epidermis. The crust has become detached on the left side over part of the area, leaving a smooth excoriated surface. Below the umbilicus, the skin is free as far down as a line drawn two inches above the pubes. At this point commences a large brown discolouration extending across the abdomen, the site of former lesions. In the left groin, extending back over the hip, is a large excoriated surface. On the right side, a previously diseased area has healed, except a small patch on the right flank. Towards the inner side of both inguinal regions, and extending for about three inches down the inner side of both thighs, is a papillary hypertrophy similar to that of the axillæ, but covered with dry brown crusts. On the front and outer side of the left thigh is a large, crusted, and excoriated patch, but there is no corresponding lesion on the right side. The front of the legs is quite clear to the ankles, but there have been two bullæ on the left leg. The ankles and the whole upper surfaces of the feet, as far as, but not including the toes, are covered with thickly-set bullæ in all stages, very much resembling the hands, but evidently more recently affected.

The disease extends round on the inner side to the soles, but there are only small bullæ in the centre.

The whole back is more or less covered with excoriated

patches, worst about the shoulders and lower part, and the skin of the whole back is sodden. The patches are quite irregular, and surrounded by whitish sodden epidermis. The excoriations are very abundant over the sacrum, but the whole of the back of the lower extremities is free. She says the back is not painful, even to lie on, but itches very much. Her arms are painful and burning, as well as itching, the latter being especially troublesome just before the bullæ appear.

The urine is of a very dark brown colour, very acid, sp. gr. 1040; no deposit, no albumen, and no sugar; no pain on micturition.

The odour from the excoriated and sodden skin was so strong and offensive that the patient was obliged to have a ward to herself.

The first care was to endeavour to remove this fœtor. The patient was placed on a water bed, and for the back and abdomen lint dipped in carbolic acid oil, 1 in 20, was applied. The papillomatous axillæ and groins were freely dusted with iodoform and the mouth washed out frequently with chlorinated soda lotion, and internally, in accordance with Mr. Hutchinson's suggestion in somewhat similar cases, Liq. Opii Sedativus ℥v was given three times a day. This was subsequently increased to ℥x.

The antiseptic measures were quite successful, the fœtor ceased almost entirely, and the fungations in the axillæ and groins became much less prominent; altogether the patient was much more comfortable, but without any real improvement in her general condition.

By June 22nd she was unable to manage solid food, and as she missed her stimulants, six ounces of port and six ounces of brandy were allowed her.

On the 29th the eyes were painful and discharging, and she was ordered boracic acid lotion.

On July 2nd her general condition was decidedly worse, but her back showed some signs of healing. The axillæ and groins were still in a raw condition, but the fungation was less prominent.

On July 4th her temperature could no longer be taken in the axillæ or mouth.

By July 6th on the inside of the arms, on the axillæ, and on the back of the hands and feet several fresh bullæ had appeared, ruptured, and left excoriated patches. The back was better at the upper part, but quite raw over the buttocks, as was nearly the whole of the lower part of the trunk near the groins.

The patient was emaciating, manifestly weaker, wandering at times, and sleeping but little; but this was not due to pain, of which she complained very little, except when her back was being dressed, or when she was moved in any way. As she could not well use a mouth-wash for herself, her mouth was sprayed with permanganate of potash solution.

On July 7th she had a rigor at 3 a.m., the temperature in the vagina was 102° and the whole condition was worse.

On the day before, a large bulla appeared on the back of the left hand, which burst and left a raw surface. The next day another bulla had developed on the back of the right hand, and another came out on the right heel.

On July 8th the patient was evidently sinking, the forehead was covered with a clammy perspiration, and the ulceration on the right side was deeper. She died at 1 p.m. on July 9th, her general condition having gone from bad to worse, quite uninfluenced by the opium The disease had lasted only three months.

Post-mortem (twenty-six hours after death).—Slight rigor mortis present. The body was not very much emaciated, the abdominal walls containing a large quantity of fat. The eruption was now represented by brown crusting on the abdomen, pubes, and sides; and by excoriated patches in the iliac regions and over the flanks and hips, round the neck down to the manubrium. The lips, lower portion of the orbits, and the edge of the upper eyelids were also excoriated.

On section.—Pleuræ: The left contained a considerable

quantity of thin, dirty-looking sero-purulent fluid, and there were adhesions at the lower part of the lung. The right contained a small quantity of similar fluid.

The lungs: On the left side, the posterior surface of the lower lobe was covered with greenish-white lymph, and the lung substance was collapsed, extremely softened, and diffluent at this part, but the upper lobe was normal. The right lung was normal in the upper lobe, but the lower lobe was œdematous from hypostatic congestion.

The liver weighed fifty ounces, the surface was pale, the substance soft, the lobules of a yellowish tint at the periphery, with central bluish-red points.

The spleen weighed two ounces, and was soft and diffluent.

The kidneys: The left weighed six ounces, the right seven ounces; the capsule stripped easily, the cortex was slightly thickened, but the kidney substance was apparently normal.

The heart: The valves were all healthy, but the walls of the left ventricle were thin and softened.

There were no signs of peritonitis or disease of the intestines.

The back: On turning the body over there were seen numerous excoriations about the shoulders, and a few smaller ones in the centre of the back, below the angle of the scapula, and several not larger than peas in the interscapular region.

There were large sloughy-looking excoriations just above the ischial tuberosity on both sides, most marked on the right.

There were similar lesions on the buttocks as far as the margin of the anal cleft, but none between the buttocks, and no condylomatous condition about the buttocks and perinæum.

On the inner side of the thighs below the buttocks the papillary hypertrophy of the skin was very marked. There was a large excoriation over the occipital tuberosity, and a few smaller near it and near the ear. Portions of skin were removed from the groin, where the papillary hyper-

trophy was most marked, for microscopical examination, and the spinal cord was also removed and placed in bichromate of ammonium for further investigation. It showed no macroscopical changes.

The spinal cord was subsequently very carefully examined in every region by my friend Dr. Frederick Mott; the appearances were, however, quite normal.

Microscopical examination of the skin removed from the groin and abdomen showed enormous filiform papillomatous processes, many with a bulbous extremity springing from the upper layer of the corium. Each process consisted of delicate fibrous tissue containing a vascular loop and covered with epidermis; some of the processes were simple, others compound, and here and there in these compound structures two processes, separated below but united above, enclosed oval layers of horny cells, due doubtless to the continued growth of what had been external epidermis, but was now enclosed by the growing processes.

In the corium, below the hypertrophied papillæ, the vessels were dilated, and there was moderate cell-effusion round them. This was also visible round some of the sebaceous glands and sweat-coils, and round the vessels of the papilliform processes which were wide enough to show it.

The following cases, given in abstract, are all that I have been able to find of the affection under consideration:

Case 1.—The first known case is recorded by Moritz Kohn (Kaposi), in an article on "Frambœsia" in the 'Archiv für Derm. und Syph.," vol. i, 1869, p. 406, as a case of "Syphilis cutanea papillomaformis (vegetans; frambœsia syphilitica)." It is also represented in figs. 63 and 64 of his 'Atlas of Syphilis of the Skin.'

The patient, æt. 43, was admitted into Hebra's Clinique on September 2nd, 1860, his disease dating one year before his admission, at which time he was cachectic and œdematous. The disease occupied the legs from the back of the

foot to the patella in front, and to the upper third of the leg behind, the pubic region and lower part of abdomen, coccygeal region, and from the trochanters over the anterior surface of the thigh, the axillæ, scrotum, &c. The skin of the fingers from the tip to beyond the middle, over the metacarpus, and the nails of both fingers and toes were deformed, flaky, and bent, and there were proliferations on the nail fold. The skin lesions on other parts presented the characters described in my own case. No mention is made of the condition of the oral or other mucous membranes. The disease extended considerably, and in some places there were deep ulcers. The patient was treated energetically for syphilis, but without benefit; nevertheless after suffering from albuminuria, dysentery, and pneumonia, he recovered perfectly, and he was discharged on April 8th, 1862. The disease had lasted three years and he had been twenty months in hospital.

Six years later (May 8th, 1868) he was readmitted; he had remained well up to nineteen weeks previously.

His second attack was exactly like the first; he did not improve, and a year later, May 8th, 1869, he was worse than ever; all varieties of the lesions described were abundant and had extended more widely. He had various treatment, chiefly of an antisyphilitic character, and when Kohn's report was made he had improved slightly; but eventually he died, as Neumann relates in his paper on "Pemphigus Vegetans."

Case 2.—Reported by Auspitz as "Herpes Vegetans," in the 1869 vol. of the 'Archiv für Dermatologie,' p. 246. A married lady, æt. 28, consulted Auspitz in May, 1868, for onychogryphosis of all the fingers; there was also marked fissured psoriasis palmaris, but no other syphilitic symptoms. She was treated for syphilis, and Auspitz did not see her again, but in January, 1869, her family doctor told him that the psoriasis had got well, the nails had improved and that she became pregnant, and was going on well until November, when grouped bullæ appeared on the abdomen in successive

crops, and subsequently became pustular, crowded, and crusted, and beneath this the surface appeared as fleshy, wart-like growths or fungations. Meanwhile the patient became feverish, then the fœtus ceased to show signs of life, œdema of the lungs set in, and she died collapsed.

Case 3 was also reported by Auspitz in the same place. The patient was a married woman, æt. 26, admitted into Hebra's clinique, in the sixth month of pregnancy. She was dyspeptic and had had hæmoptysis, but no cause could be assigned for the eruption, which came out fourteen days previously, on the abdomen and lower limbs. She had no albuminuria, but had had occasional clonic spasms for the last thirteen months, and these recurred ten days after admission in the upper and lower extremities, lasting for some seconds, but without loss of consciousness. The spasms got worse in the next few days, and on the seventeenth day lasted half an hour, with loss of consciousness. Meanwhile raspberry-like proliferations had developed in the right groin, where Hebra had cauterised the crusted and excoriated patches; but they extended beyond the cauterizations, and a few days later appeared in the lower part of the abdomen, on the inner surface of the thighs, and on a palm-sized patch on the left leg, and also between the labia. Beyond the border of the growth was a dark, excoriated, weeping base.

On the eighteenth day the amnion burst, and fœtal life ceased; and on the nineteenth a dead fœtus, sixteen inches long, was expelled, without any eruptions on it. On the twenty-fourth day there was restlessness, delirium, and diarrhœa, without tenderness, and on the twenty-seventh day she died, after six weeks' illness.

Post-mortem.—Purulent peritonitis, inflammation of the whole of the whole of the organs of generation and some bronchitis.

Auspitz thought that two similar cases had been recorded by Köbner, a man and a woman, under the name of "Berry-like Multiple Papillary Growths of the Skin;" a male

case, of Alibert, quoted by Köbner; and two male cases by Bazin, but these were all probably cases of Mycosis fungoides.

Case 4 is the text case of Neumann's paper on pemphigus vegetans in vol. xiii of the 'Viertelj. für Derm. u. Syph.,' p. 157,—a strongly-built, healthy woman, æt. 31, who only complained at first of pain on swallowing. When first seen by Neumann there was a thaler-sized patch of the usual characters in the axilla; soon after a bulla came on the lower lip, followed by numerous bullæ on the mucous membrane of the lips, mouth, and pharynx, so that nutrition became difficult. The condylomatous character of the axillary regions led to the diagnosis of syphilis. Soon after, bullæ appeared, at first of the ordinary character, but running the course of other cases of pemphigus vegetans. The oral mucous membrane became more and more affected *pari passu* with the skin, and feeding had to be effected through a tube. The conjunctiva was next involved, hiccough supervened, very scanty urine was passed, and the air of the room became very strongly impregnated with ammoniacal odour. On March 22nd, as the greater part of the skin was involved and decomposition could not be arrested, she was put into a bath at 29° R. for three hours a day; at first with some perchloride of mercury and afterwards without any, but for eight hours at a time. In the intervals salicylic wool was found to be the best to remove fœtor. Food and drugs had to be administered through the rectum, and she died on March 30th of progressive emaciation after four months' illness.

Case 5 was an engineer, æt. 50. He was at first treated for syphilis, but later on a correct diagnosis was made. He died, but Neumann gives no further particulars.

Case 6 was a case in Kaposi's clinique seen once by Neumann, but I have not been able to find out further particulars. The next four were more closely observed by Neumann.

Case 7, related in Neumann's paper, was that of a lawyer, æt. 30, who had been previously treated for syphilis with iodide of potassium. He came under Neumann in April, 1884, the disease having begun in October, 1883, with pain in the throat; the fingers and toes were affected, there were the usual papillary growths, the bullæ came out continually in crops, and he died emaciated and exhausted on August 2nd, 1884, having been ill ten months.

Case 8 was a woman, æt. 56. She first came under observation February 23rd, 1885, having been ill four months. The disease began with throat symptoms, and she was treated for syphilis by inunctions. The whole oral and pharyngeal mucous membranes were affected, and also the vulva. The eruption presented the usual characters, but one bulla on the foot became gangrenous. About a month before death, which took place early in August, painful contractions appeared in the right knee and left elbow-joints, lasting only a few moments, but recurring frequently. The reflexes were heightened, both on the patella and biceps. There was œdema of the whole left leg to the hip, and considerable emaciation. The duration of the case was between nine and ten months.

Case 9 was a woman, æt. 41. Her illness began in September, 1884, with pain in the palate; she was admitted into the hospital on September 30th, 1885. The under lip was enlarged; both it and the tongue were denuded of epithelium. There was continual salivation, flattened bullæ at the angles of the mouth, and brown crusts round the nostrils. The skin lesions presented the usual characters in the genito-crural, anal, axillary folds and elsewhere.

The eruption continued to appear in crops at intervals, and she could only take fluids. On November 13th the patella and biceps reflexes were increased, there was delirium followed by collapse, and she died on November 16th, with a total duration of the disease of fourteen months.

Case 10 was a woman, æt. 61, admitted July 15th, 1885,

after nine months' illness. She had a similar eruption in the same positions, and running a course like the rest, until September 15th, when she had pains in the neck, dysphagia, hoarseness, and dyspnœa. The hoarseness continued, and on the 21st bronchitis developed. On October 13th it was noted that the nails of the big toes were fissured, uneven, and furrowed, both longitudinally and transversely; the nail was discoloured, and the nail-fold surrounded by crescentic papillomatous, exuding, and crusted fungations.

On November 11th there were pains in the head, complete dysphagia for solid food, partial even for liquids, and there was right ptosis. On November 21st she refused food, and was delirious; and she died the next evening, the duration of the disease having been thirteen months.

In the 'Medicinische Jahrbücher' for 1885, p. 539, G. Riehl publishes two cases observed in Kaposi's clinique. His paper, "Zur Kenntniss des Pemphigus," is translated in a full abstract in the 'Annales de Dermatologie' for 1886, p. 163. It is possible that one of them is Case 5 of my series, of which Neumann gave no particulars.

Case 11.—A previously healthy man, æt. 24, was admitted into the Vienna Hospital on August 15th, 1883. He had suffered for four weeks from a bullous eruption which began on the face and anterior border of the axillæ and then spread by successive crops over the abdomen and limbs. The bullæ were for the most part of the usual characters, but in the lower part of the abdomen, the axillæ and wrists, they underwent the papillomatous change and extended at their borders. The mucous membrane of the palate, cheeks, and lips was involved, continuous crops appeared on the eyelids, neck, hands, and at the periphery of the older plaques. The patient emaciated in spite of all treatment and died on September 21st, the disease having lasted nine weeks. At the post-mortem, the oral mucous membrane and tongue are described as ulcerated superficially, but the visceral changes, with the exception of bronchitis, were insignificant.

Case 12 was a man, æt. 45. He had never been ill until eight weeks previously to his admission to the hospital on January 6th, 1884. The first symptom was intense dysphagia which lasted two days and was followed by the appearance of bullæ on the palate and tongue. They soon extended to the circumference of the mouth, the lips, the eyelids, and then gradually to the trunk and limbs. The patient was a strongly built man, but on admission was emaciated and weak. The skin round the orbits and mouth and nearly the whole surface of the body was covered with excoriated crusted patches, but the palms and soles were free. There were not only extensive excoriations in the mouth, tongue, palate and cheeks, but in the epiglottis and in the larynx, so as to produce aphonia. There was severe conjunctivitis and the cornea was dull. The bullæ were of the ordinary characters with opalescent contents, whilst others in the flexures had the papillomatous base already described. There was a similar papillomatous condition of the anterior portion of the skin of the penis and of the prepuce. There was no albumen or sugar in the urine, and no visceral disease, but the man became weaker and weaker, and died on January 13th, the disease having lasted only nine weeks. The only post-mortem visceral change of importance was left broncho-pneumonia.

The next two cases are reported by Mr. Jonathan Hutchinson in the seventieth volume of the 'Medico-Chirurgical Transactions,' p. 421, under the title of "A Form of Chronic Inflammation of the Lips and Mouth." When the paper was read I suggested that they were really the disease already described by Neumann.

Case 13 was a master currier, æt. 58, who began to be ill at Christmas, 1879, and died in the beginning of May, 1880. His illness began with a sore mouth followed by swollen hands and feet like "chilblains." Then a vesicular eruption appeared on his hand with onychitis and accompanied by spontaneous ptyalism, sore-throat and sore lips. Next a bullous eruption extended over the whole body, his nails

fell off, large granulation-masses developed on the sores left by the bullæ, and some of these became pedunculated. Death occurred from exhaustion in less than five months from the commencement.

Post-mortem.—Broncho-pneumonia and left pleurisy were found; and a large lympho-sarcomatous tumour in front of the spine embedding the pancreas and large vessels, and weighing three and a half pounds. Of this last he presented no symptoms during life, and it did not appear to have contributed materially to the fatal result.

Case 14 was a gentleman whose illness began in the winter of 1882. On February 18th he had "a severe form of inflammation of the mucous membrane of the mouth," but he had been under previous treatment and was taking iodide of potassium; a single mercurial pill was given and produced profuse ptyalism. Soon after this, papillary growths appeared in the groins; inflammation, first of the toe-nail and then of the finger-nails, ensued. Then small bullæ appeared in succession, on the feet, legs, trunk and arms, and when they broke, in the flexures, papillary excrescences sprouted up from their base; the mouth continued very sore, there was constant ptyalism, he became greatly emaciated, and very weak, and sank from exhaustion.

At the autopsy there was only recent hepatisation of the base of the right lung.

Mr. Hutchinson also relates three cases, which although probably, do not certainly, belong to the form of disease under discussion; and the important feature is, that they, unlike all the rest, recovered under the administration of opium in the form of Liq. Opii Sedativus ℥viij to ℥x three times a day. Moreover, the skin lesions were slight, not characteristic, or absent.

Case 1 was a master tanner, æt. 50, of previously good health. His illness began with a sore mouth. When seen by Mr. Hutchinson on March 25th he had sores on his lips, inside the cheeks, and on the palate, consisting of large

ulcerated patches with red margins, and covered by a pellicle; the tongue was not much affected. After the sore mouth had lasted about three months "some patches of a sort of a papillary psoriasis appeared on the backs of his hands, his toe-nails inflamed, and several of them were lost." He became very weak and lost much flesh, but after other treatment had failed he recovered under 10 minims of Liq. Opii Sedativus three times a day, and ceased attendance on June 30th. Two years later he had had no relapse.

Case 2 was a clergyman, æt. 46, previously healthy, whose illness began with a sore mouth, the tongue was first affected and afterwards the gums, cheeks and lips. He lost flesh and strength, and when seen by Mr. Hutchinson four months after his illness began there was much ulceration of the mouth, but no skin eruption. Subsequently he came under the care of Mr. Pollock, and got well as a result of treatment by opium.[1]

Case 3 was a farmer, æt. 66, who had a condition of mouth similar to that of the last case, but had no disease of the skin or nails. He came under treatment six weeks from the onset, and small doses of Battley's solution were given at first, but without improving his condition. After six weeks' treatment, he became so thin and weak that his life was in danger; then the opium was increased to 8 minims, and in a fortnight he was very much better. The dose was further increased, and in a few months he recovered completely, and a year later there had been no recurrence.

Case 4.—The particulars were insufficient for a diagnosis. A gentleman under the care of Mr. Charles Macnamara was seen once by Mr. Hutchinson. He had a very sore mouth, an eruption on the skin, of which the character was not stated, and he died a few weeks after Mr. Hutchinson saw him. Previous to the last illness his health had been bad, in consequence of chronic diarrhœa.

[1] "On the Use of Opium as an Aid to Surgery," 'Brit. Med. Journ.,' 1884, vol. i, p. 801.

An analysis of these fourteen undoubted cases, in addition to my own, enables the following account of this rare and formidable disease to be drawn up.

Without any preceding illness or other apparent cause, the disease commences in the majority of cases by pain on swallowing, or at all events soreness of the mouth; examination shows that this is due to the formation of bullæ on the tongue, pharynx, or other part of the oral mucous membrane. After a few days or weeks, skin manifestations develop either in the form of tense bullæ with clear contents of the ordinary pemphigus type, or the contents may be sero-purulent and imperfectly fill the bulla. These bullæ frequently appear first upon the abdomen, but there is no rule upon this point; the outside of the lips, the chest, especially at the borders of the axillæ, are also places where they have commenced in more than one case. It is, however, the course that the bullæ run which constitutes one of the most striking features of the disease.

Instead of drying up in the ordinary way, leaving only the roof of the bulla as a thin scab, which soon falls off, the base of the lesion remains, in the great majority of bullæ, as an excoriated surface, which may continue raw for an indefinite period, or if it does heal eventually, leaves deep brown pigmentation. These raw surfaces are, as might be expected, largest and deepest and most obstinate on points of pressure, such as the occiput, shoulders, sacrum, and hips.

In the axillæ, groins, gluteal fold, the lower part of the abdomen, and in women about the vulva, in short, in warm moist situations where folds of skin are in contact, another even more striking phenomenon occurs on the site of the ruptured bullæ, viz. papillary proliferations of the derma projecting from a quarter to half an inch above the surface, and secreting a muco-purulent offensive fluid.

These circumstances, and their occurrence about the genito-anal region, naturally suggest condylomata, and coupled with the ulceration of the tongue and mouth, have

frequently led to the affection being diagnosed as syphilis, and treated accordingly, very much to the detriment of the already serious condition of the patient.

The course of the disease, in all the undoubted cases but one, has been steadily downwards; in one, recovery occurred, but some years later another attack carried off the patient. The rule is, that fresh crops of bullæ continue to come out at intervals; and as the condition of the mouth continues and becomes aggravated, the administration of food becomes more and more difficult. Nutrition, therefore, suffers from this cause as well as from the disease itself, which, as in all forms of dermatitis involving a large surface of the skin, produces great exhaustion and emaciation. The fœtor from the raw surfaces and papillary growths is very penetrating and almost insupportably nauseous, and after a course of weeks or months the patient dies exhausted from pain, difficulty of ingestion of food, and the large extent of the skin eruption; delirium, collapse, or some intercurrent inflammation closing the scene.

Variations.—In some cases, the skin eruption precedes the affection of the mouth, but it is difficult to ascertain how often this occurs, as the early history is defective in some of the cases, and the ulceration of the mouth is not always mentioned. In five instances at least, there has been a suppurative onychitis of some or all of the fingers and toes, and consequent shedding of the nails. Clonic convulsions and heightened reflexes of the patellar and other tendons have been observed by Neumann in more than one instance, and then death occurred by coma. Ptyalism has been noted in both of Mr. Hutchinson's and in one of Neumann's cases, of course aggravated if mercury had been given. Elevation of temperature has seldom been a conspicuous feature. Besides the oral mucous membrane, those of the conjunctiva and vulva are generally affected.

Diagnosis.—The diagnosis ought now to present no difficulty. It is true that the presence of ulceration of the mouth and lesions like condyloma about the genito-anal region is strongly suggestive of syphilis; and this dia-

gnosis has been made by experienced observers before the disease was understood. The following form a distinctive group of symptoms to anyone cognisant of the existence of the disease: The onset with dysphagia or ulceration of the mouth, followed by a pemphigoid eruption on the skin, in which the bullæ leave superficial ulcerations on their site; while in warm and moist situations like the groins and axillæ, exuberant fungating masses spring up after the bullæ have ruptured.

The post-mortem records do not throw any light upon the origin of the disease. In a puerperal woman there was peritonitis and inflammation of all the organs of generation, and in one case there was a large lympho-sarcoma in front of the spine, unsuspected during life. Bronchitis, pleuro-pneumonia, and croupous pneumonia by itself have been described, but these are all consequences rather than causes of the disease. The spinal cord was examined in my case with a negative result, but in future cases it would be worth while to examine the spinal ganglia and peripheral ends of the nerves. In the majority of the cases there has been little to account for death, except the extensive skin lesions.

To assume, what is probable enough, that the disease is a neurosis, is practically no real advance in our knowledge as to its nature, and for the present we must confess ourselves utterly ignorant both of its pathology and etiology.

Treatment.—With one possible exception, all treatment has proved utterly futile to arrest the fatal course of the disease. Much, however, may be done to alleviate the suffering of the patient, and to remove the fœtor due to the decaying epithelium. Such measures, as already detailed, were quite successful in my own case, and Neumann obtained a similar result by using the continuous bath for several hours a day, and salicylic acid wool. Antiseptic washes for the mouth such as chlorate of potash lotions, or, when the patient is too weak to use them, permanganate of potash solution sprayed in, are also useful. The one possible exception to the futility of internal treatment is that

suggested by Mr. Hutchinson, namely, opium. It is for this reason that I have included an abstract of his three patients, who recovered under its use; but although probably of the same nature, it is not certain that they were so, as the characteristic skin symptoms had not developed. In my own case opium was tried in vain, both in the early stage, before I saw her, and after she came to me; it was then given in full doses, but probably the disease had gone too far, while at the beginning the opium certainly failed to relieve, but possibly it was not given in adequate doses, ten minims of the Liq. Opii Sedativus, three times a day, being the least dose likely to be beneficial.

Table of all recorded cases of Pemphigus Vegetans.

No.	Sex.	Age.	First symptoms.	Mucous membrane affected.	Nails involved.	Previous health.	Duration.	Post-mortem.	Reporter.	Name given to disease.	Where published.	Remarks.
1	M.	43	?	No mention	Yes	Good	1st attack 3 years, 2nd over 1 year	?	M. Kohn	Syphilis vegetans	Archiv für Derm. u. Syph., vol. i, 1869, p. 406, and plates lxiii and lxiv in Kaposi's Atlas of Syphilis der Haut	The patient was in Hebra's Clinique; second attack 6 years later than first; was alive when first reported, but Neumann says he died subsequently.
2	F.	28	Grouped bullæ on abdomen	?	?	Pregnant when attacked; probably had syphilis	A few weeks	None	Auspitz	Herpes vegetans	Loc. cit., vol. i, p. 246	—
3	F.	26	Bullæ on abdomen and lower limbs	Vulva	?	Pregnant	6 weeks	Purulent peritonitis and inflammation of all organs of generation	„	„	Loc. cit., vol. i, p. 248	Clonic convulsions and heightened reflexes.
4	F.	31	Dysphagia	Lips, mouth, pharynx, and conjunctiva	—	Very good	4 months	?	Neumann	Pemphigus vegetans	Vierteljahrschrift für Derm. u. Syph., vol. 1886, p. 159	—

No.	Sex.	Age.	First symptoms.	Mucous membrane affected.	Nails.	Previous health.	Duration.	Post-mortem.	Reporter.	Name given to disease.	Where published.	Remarks.
5	M.	50	?	?	?	?	?	?	Neumann	Pemphigus vegetans	Loc. cit.	No particulars, except that at first syphilis was diagnosed, and that he died.
6	?	?	?	?	?	?	?	?	„	„	Loc. cit.	Seen once by Neumann in Kaposi's Clinique.
7	M.	30	Pain in the throat	—	Yes	?	10 months	?	„	„	Loc. cit.	Was treated for syphilis at first.
8	F.	50	„	Mouth, pharynx, vulva	?	—	9—10 months	?	„	„	Loc. cit.	Had clonic and tonic contractions and exaggerated reflexes.
9	F.	41	Pain in palate	Mouth, tongue, nostrils	?	—	14 months	?	„	„	Loc. cit.	Ptyalism, exaggerated reflexes.
10	F.	61	Bullæ on skin	Mouth, pharynx	Yes	—	13 months	?	„	„	Loc. cit.	Dysphagia, ptosis, delirium.
11	M.	24	Bullæ on face and axillæ	Mouth, conjunctivæ	No	Good	9 weeks	Bronchitis	Riehl	Pemphigus	Med. Jahrbücher, 1885, p. 539	In Kaposi's Clinique.
12	M.	45	Intense dysphagia	Mouth, tongue, conjunctivæ, epiglottis, larynx	No	„	9 weeks	Left broncho-pneumonia	„	„	Loc. cit.	„

13	M.	58	Sore mouth	Mouth	Yes	„	5 months	Broncho-pneumonia, pleurisy, and large sarcoma	J. Hutchinson	Chronic inflammation of lips and mouth	Med.-Chir. Trans., vol. lxx, 1887, p. 421	Ptyalism.
14	M.	?	„	„	Yes	„	—	Right pneumonia	„	„	Loc. cit.	„
15	F.	43	„	Mouth, nose, conjunctivæ, vulva	No	„	3 months	Left pleuro-pneumonia	Radcliffe Crocker	Pemphigus vegetans	Loc. cit. present vol.	—
16												

Analysis of the 14 available cases shows 7 males and 7 females, their ages varying from 24[1] to 58. In 12 cases in which the mode of onset is mentioned, it began with dysphagia or sore mouth in 8, and with bullæ on the skin in 4; but in at least 10 the oral mucous membrane was affected at some time. There was suppurative onychitis in 5, ptyalism in 3, exaggerated reflexes in 3, clonic convulsions in 2. The general health before the onset of the disease was nearly always good, but 2 were pregnant when attacked. Excluding Case 1, in whom the first attack lasted three years, and six years later his second fatal illness lasted thirteen months, all the cases were fatal in from six weeks to fourteen months, and the post-mortem changes were for the most part insignificant and clearly secondary.

[1] In Dr. Mapother's case mentioned in the discussion, the patient was a woman, æt. 21, who was treated for syphilis, and died after nine weeks' illness.

(For report of the discussion on this paper, see 'Proceedings of the Royal Medical and Chirurgical Society,' Third Series, vol. i, p. 95.)

DESCRIPTION OF PLATE V.

Pemphigus Vegetans (Neumann) (H. RADCLIFFE CROCKER, M.D.).

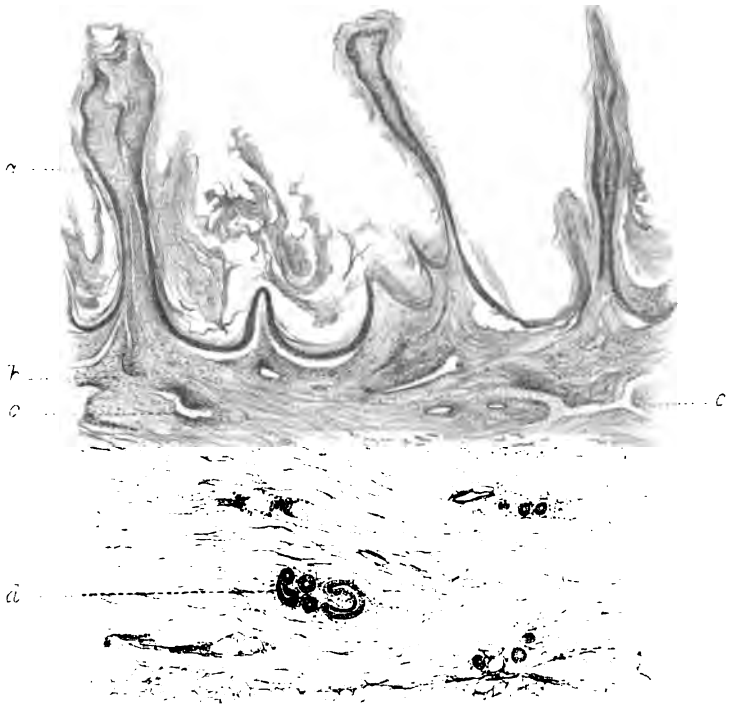
Section of skin taken from groin, showing enormously hypertrophied papillæ.

a. Papillary outgrowth.

b. Cell infiltration in papillary layer.

c. Dilated vessels.

d. Sweat coil, with cell infiltration between the coils.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ON THE CLINICAL SIGNIFICANCE

OF

COLOURLESS OR CLAY-COLOURED STOOLS UNACCOMPANIED BY JAUNDICE,

AND THEIR CONNECTION WITH

DISEASE OF THE PANCREAS;

AND ON THE PART PLAYED BY THE PANCREAS IN ELIMINATING BILE FROM THE INTESTINES.

BY

T. J. WALKER, M.D.

(Communicated by Sir ANDREW CLARK, Bart., M.D., F.R.S.)

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THE colour of the fæces of the healthy human adult is brown;—the shade may vary in perfect health according to the nature of the ingesta or other circumstances, but the brown colour is invariable. It is an accepted clinical fact, that any cause which prevents the entrance of bile into the intestine deprives the stools of this normal brown colour.

Hence the appearance of colourless or clay-coloured stools is almost universally accounted for by the supposition that there is a deficiency of bile in the intestines. But the colour of fresh bile is a bright yellow, and the colour of stale bile, and of bile which has been exposed to the air, is green. Bile stains the urine and all the tissues in which it may be detected yellow and not brown. The

most recent chemical authorities tell us that the colouring matter of the bile is bilirubin ($C_{32}H_{36}N_4O_6$), which by oxidation becomes biliverdin ($C_{32}H_{36}N_4O_8$). These colouring matters are not found in the fæces, but another matter, which is called stercobilin or most recently hydrobilirubin ($C_{32}H_{40}N_4O_7$), and which is said to be identical in composition with urobilin.[1] Further, it has not escaped the observation of physicians that cases occur in which colourless or clay-coloured stools are persistently present without jaundice or other evidence of disorder of the liver.

In the face of these facts it is not surprising that many accurate observers who have given attention to this matter cannot accept as full and sufficient the explanation that colourless stools depend on defective bile-supply.

Physiologists still speak in uncertain tones of the cause of the colour of the fæces; thus, Michael Foster sums up his remarks on the subject in words which clearly show his sense of the insufficiency of the present knowledge on the subject:

"The fact that the fæces become 'clay-coloured' when the bile is cut off from the intestines shows that the bile pigment is at least the mother of the fæcal pigment."

Among physicians I will quote only from Dr. Wickham Legg the following passages, as showing that the most recent writer on a subject of which he has made a special study also feels that the usual explanation is only a partial one.

"The want of colour in the fæces is almost universally set down to a decrease in the secretion of bile. But I should like to point out that of this there is no evidence. The absence of bile is, no doubt, the cause of the white stools in jaundice; but it would be highly imprudent to assert that it is the only cause of want of colour in every disease. In many kinds of brutes the fæces are grey or even white in health, and in some of these, as in the dog,

[1] By whatever names these ingredients of bile and of fæces respectively may be called, the fact remains that the colouring material of the fæces is neither chemically nor in outward appearance identical with that of bile.

there is evidence that the liver is as active as in man. The colour of the fæces, then, is not due to the want of the secretion of bile; it is rather more likely to be due to the absorption of the bile after it has passed into the intestine. Then on certain diet, as milk, the stools often become light coloured; yet there is no evidence of a decreased secretion of bile, or of an increased absorption of bile from the intestine. It is easy to imagine a cause for this lack of colour, but there is no certain knowledge about it. . . . ."

"To tell the truth, very little knowledge exists as to the cause of the colour of the fæces, either in health or in disease. . . . ."

"The only proposition that can be safely upheld is that bile is not the sole cause of all the changes of colour," &c.

My object in this paper is to establish the following facts, namely: That the presence of the pancreatic juice in the intestines is as essential as that of the bile to produce the brown colour of the dejections; that the so-called colourless stools may consequently be caused by disease of the pancreas, when the liver is perfectly healthy; that they may be caused either by cutting off the supply of pancreatic juice or the supply of bile; *that the bile which appears in the fæces is that only which has been acted on by the secretion of the pancreas;* and that consequently the latter organ *has a hitherto unsuspected physiological and pathological importance* as a factor in the elimination of bile.

After giving particulars of the two cases which led me to this discovery, I shall adduce confirmatory evidence in support of my views, and I shall, I think, be able to show that the facts if accepted are of the greatest practical value to physiologists, pathologists, and practitioners.

Case 1.—T. W—, a medical practitioner, of robust frame and active habits, in the summer of 1862, being then sixty-five years of age, began to suffer from a relaxed condition of the bowels and from slight pain in the epigastric

region, accompanied with a certain amount of derangement of the general health. Soon after these symptoms set in, the absence of colour in the motions attracted notice.

The late Dr. Budd and other men of eminence were at various times consulted, and could give no opinion but that there was obscure disease of the liver which prevented the formation of the colouring matter of the bile.

The epigastric pains passed off, and the general health became apparently as good as possible, but the passage of large colourless stools, of a peculiar putrid rather than fæcal odour, remained as a persistent symptom. In the course of time it was found that the dejections were occasionally accompanied by free oil or fat which floated either as a liquid or solid substance on the surface of water, and that the stools themselves were greasy. From these indications it was assumed that the pancreas was implicated.

As these symptoms continued through many years, while the patient remained apparently otherwise in perfect health and actively pursuing his profession, I came to the conclusion that, notwithstanding the colourless stools, the diagnosis of disease of the liver must be wrong, and that the pancreas alone was probably at fault.

In November, 1876, when the symptoms had lasted for fourteen years T. W— had a slight attack of pneumonia, accompanied at its onset by severe constitutional disturbance altogether disproportionate to the local mischief and followed by an illness having the character of pyæmia lasting through several weeks. This brought him almost to death's door, but he ultimately recovered from it.

In the course of this illness there was for some few days distinct icterus with deep staining of the conjunctiva, skin, and urine. This proved that no organic disease of the liver which prevented the formation of bile existed. During the ten years which Dr. W— survived this attack the stools remained, as before, absolutely devoid of brown colour. Their consistence and appearance varied somewhat with the character of the ingesta. On exclusive milk diet they were occasionally as white as snow, but they were

usually the same large, rather relaxed, putrescent, greasy, clay-coloured stools noted at the onset of the symptoms.

There was never, excepting at the time noted above, in 1876, when jaundice occurred, any evidence of the secretion of bile.

On the 14th December, 1886, T. W—, being then in his ninety-first year, died, the cause of death being chronic cystitis and double orchitis.

Necropsy.—On December 15th, Dr. Kirkwood and Dr. W. E. Paley examined the abdomen, and gave me the following report.

"Abdomen only examined. No marked absence of fat considering the age of Dr. W— (ninety years), and the three weeks of exhausting illness which had preceded death.

"Liver normal in size and appearance, though perhaps somewhat less firm than usual.

"Gall bladder contained about an ounce and a half of bile and four small soft gall-stones. Bile-ducts, cystic duct, and common duct normal, absolutely patent, and on opening the duodenum recent fresh bile was seen in it. The blow-pipe passed readily through the opening into the duodenum up through the bile-ducts to the liver.

"The mucous lining of the duodenum appeared rough, as though the glands were larger and more crowded than usual.

"Pancreas large, the head measuring three inches across, and the length being about nine inches; in structure it appeared almost pure fat, except near the duct, where it was more fibrous. The duct was dilated (on making a transverse section it stood out in the middle of the gland as an opening that would take in about a No. 14 urethral bougie); the various branches of the duct were also dilated, and two of them contained small calculi. Tracing the duct towards the duodenum the dilatation was found to extend up to within an inch of the duodenum, where the duct was blocked and rendered *absolutely impervious* by a very irregular stone, about eight lines long and between three and four lines wide at its broadest point.

The duct closely embraced the stone, fitting its various interstices and appearing to adhere to it. Beyond this stone the duct was found with difficulty, but it was pervious to a probe."

CASE 2.—Mr. H—, æt. 56, civil engineer, was seen by me in consultation with Dr. Cane in the summer of 1881. He presented indications of chronic phthisis, but in addition I was informed that for some years Mr. H— had suffered from diarrhœa, passing copious, loose, greasy, stone-coloured evacuations, one of which had been saved for my inspection. I recognised at once that the fæces had the same characteristics which were present in the case of T. W—, especially the absence of the slightest brown or yellow colouring matter. Mr. H— was said to have had various severe illnesses, and seven years previously he had been suddenly attacked when resident in Monte Video with hæmatemesis and melæna so severe as to cause prolonged syncope. It was since this attack that he had become liable to the peculiar condition of the bowels, for which he had consulted the late Dr. Wilson Fox and other authorities. The want of colour in the stools was specially noticed and remarked upon at this time, and Mr. H—'s widow tells me that her husband, being well aware of this peculiarity in his case, would say over and over again, "Do look and see if there is any colour; I think if there were I should be better." He had also suffered from glycosuria. *He was not jaundiced.*

The condition of the bowels remained the same up to Mr. H—'s death, which took place in November, 1881. A post-mortem was made by Dr. Cane in my presence. The lungs showed advanced disease. The liver was normal; the gall bladder and ducts contained normal bile, and the ducts were pervious up to and into the duodenum, but close to the opening of the duct and involving the portion of the intestine in which the termination of the duct of Wirsung runs was the puckered cicatrix of an old ulcer (doubtless that which had bled in Monte Video seven years before).

The pancreatic duct and its branches were greatly enlarged. The duct could be traced and was pervious up to the point where it entered the duodenal wall, but here it was lost in the cicatrix. As I was anxious that the genuineness of this link in the evidence which I was accumulating should be vouched for by some high authority, Dr. Cane cut out the portion of the duodenum, with the cicatrix and the adjoining portions of the bile and pancreatic ducts, and sent them to an eminent pathologist with a request that he would carefully dissect out the ducts, and report whether the result of his examination confirmed our opinion, that the bile-duct was absolutely free, and that the pancreatic duct was partially destroyed and completely occluded by the ulceration and cicatrisation which had occurred some years before. After waiting some time for the report Dr. Cane wrote to his friend, who in reply told him that the specimen had been put on one side and lost before he had an opportunity of examining it. I am consequently unable to show you the specimen or to confirm Dr. Cane's report by the authority whose aid we sought.

In these two cases we have the condition brought about by disease in the human subject which experimentalists have induced in animals by ligature of Wirsung's duct, and we have it brought about in such a way that there is no disturbance of the neighbouring parts and no interference with the function of other organs.

The two cases are intimately interwoven. On the one hand, the true significance of the colourless stools in the second case would not have been recognised but for the concurrent symptoms which had been observed during life in the first case ; on the other hand, it was the result of the post-mortem examination in the second case which first afforded proof of the correctness of my conjectures as to the significance of the stools in the first case.

However imperfect my description may have been I hope to have impressed upon you these facts :

In Case 1—

1st. Dr. W— for twenty-four years passed only clay-coloured, stone-coloured, or colourless stools.

2nd. He showed no other symptoms whatever of derangement of the excretive or secretive functions of the liver.

3rd. He passed in the dejecta free oil and fat recognised as a sign of pancreatic disease.

4th. From the symptoms during life I diagnosed pancreatic disease and excluded hepatic disease.

5th. The necropsy revealed absolute occlusion of the pancreatic duct by a calculus and a perfectly normal condition of the liver and its ducts.

In Case 2—

1st. Mr. H— for several years passed stools devoid of colouring matter.

2nd. Although it was not observed that he passed free fat or oil,[1] the similarity of the greasy, pultaceous, absolutely colourless stools to those of Dr. W—, and the absence of any other symptoms of hepatic disease except the stone-coloured stools, led me in this case also to surmise obstruction of the pancreatic duct and to exclude hepatic disease.

3rd. The necropsy revealed the blocking of the pancreatic duct by ulceration and cicatrisation, and a perfectly normal condition of the liver and its ducts.

From these facts I conclude:

1st. That the formation of the colouring matter of the fæces (hydrobilirubin ?), depends on *the mutual reaction of the bile and pancreatic fluid, under the influences met with in the intestinal tract.*

2nd. That in disease a deficiency of pancreatic juice will, equally with a deficiency of bile, cause the pathological condition of colourless or clay-coloured stools,—that is, stools destitute of hydrobilirubin.

3rd. Since, according to the most recent physiological researches, that portion only of the coloured constituents

[1] Since writing this paper I have been informed by Dr. Cane that after I saw Mr. H—, and suggested that the white stools depended on pancreatic disease, he watched for the passage of free oil and several times detected it.

of the bile which has been converted into hydrobilirubin is excreted in the fæces, while the bilirubin, bilifuscin, and biliverdin not so converted are absorbed, it follows that if hydrobilirubin (the colouring matter of the fæces) cannot be produced without the aid of the pancreas, that organ must have an important *rôle* in regulating what proportion of the bile secreted by the liver shall be absorbed in the intestine, and what shall be thrown off in the fæces.

In seeking in clinical records for confirmatory evidence of these conclusions which I wish to establish as axioms, we are met by the difficulty that the pancreas has received even in the present day but little, and until recently no attention, either clinical or pathological.

This neglect has arisen mainly from our ignorance of the clinical symptoms which may be accepted as diagnostic of pancreatic disease, and from a belief in the extreme rarity of uncomplicated cases. Without multiplying quotations to prove this assertion I will merely point out that the author of the article on the diseases of the pancreas in Quain's 'Dictionary of Medicine,' does not even allude to fatty stools except casually as a symptom of cancer of the pancreas. And taking the most recent English text-book on medicine, that of Bristowe, I find that, although he treats the matter more fully, he commences his remarks on the subject by saying, "Very little of clinical value is known about the diseases of the pancreas;" and later on, after discussing the pathology, he says, "It would be a waste of time to discuss the diagnosis of the above lesions. . . . It would be equally a waste of time to enter upon the discussion of the treatment of pancreatic affections."

Friedreich, in his elaborate article in 'Ziemssen's Cyclopœdia,' writes, "The pancreas does not possess any special function, the disturbance of which would produce not pathognomonic but even appreciable symptoms;" and he introduces the subject of symptomatology at the conclusion of his remarks on general pathology thus, "All these facts explain why our knowledge of the pathology of the pancreas is so scant and so far behind that of all the other

internal organs. How little we have to rely upon for our diagnosis will be seen from the following description," &c.

But even where attention has been given to this organ there is the further difficulty arising from the fact that those who have observed and recorded cases of pancreatic disease are, with one notable exception, so prepossessed with the idea that the occurrence of colourless or clay-coloured stools necessarily indicates disease of the liver that they either ignore the condition of the stools or draw wrong inferences from them. I have said with one notable exception, that being no less an authority than Claude Bernard, to whom is mainly due our knowledge of the action of the pancreatic fluid on fats, &c.

In an essay published thirty-two years since[1] he says, "It is remarkable that bile only colours matters a very bright yellow, while with the pancreatic juice the bile takes a decided brown tint. The pancreatic juice then contributes indirectly to the colouring of the fæcal matter."[2]

Extract from p. 491 :

"Conclusions des observations pathologiques. Toutes les observations précédentes dans lesquelles l'autopsie a permis d'établir l'état du pancréas, montrent clairement que la lésion fonctionelle du pancréas se traduisait symptomatiquement par la présence des matières grasses dans les excrements, de même que chez les chiens auxquels nous avons opéré la déstruction du pancréas. Nous avons pu voir jusqu'à quel point ces symptômes se ressemblent. Amaigrissement, émaciation, voracité, même apparence des matières fécales qui sont argileuses, pâles et grisâtres. Il est remarquable que le bile ne colore que les matières en jaune tres clair, tandis qu'avec le suc pancréatique le bile prend une teinte très brune. Le suc pancréatique contribue donc indirectement à la coloration des matières

[1] 'Supplement aux Comptes rendus hebdomadaires des Séances de l'Academie des Sciences,' tôme première, Paris, 1856.

[2] Ibid., 'Mémoire sur le Pancréas, et sur le rôle de suc pancréatique dans les phénomènes digestifs, particulièrement dans la digestion des matières grasses neutres,' par M. Claude Bernard.

fécales. Dans l'ictère les matières sont aussi décolorées, mais par une cause inverse. Enfin il est dernier trait de ressemblance ; ce sont les stries sanguinolentes que nous avons observées sur les excrements chez les chiens, ainsi que des ulcérations intestinales ; ces lésions se sont aussi rencontrées chez des malades. Tous ces faits sont dignes des meditations des pathologistes et des physiologistes, parce qu'ils sont de nature à montrer la liaison étroite qui unit la pathologie à la physiologie et combien cette dernière science peut jeter de lumière sur la première."

This important conclusion of Claude Bernard appears to have escaped the notice of all physiologists and physicians, excepting that of M. Ancelet.[1] He quotes the paragraph, but expresses his opinion that "the conclusion is erroneous." The majority of those who report cases or treat of pancreatic disease only mention the decolouration of the stools as evidence that the liver is implicated, but the facts as reported by them do not always support this view. Thus in one of the very earliest cases in which attention was drawn to the presence of fat and oil in the dejecta, that of Mrs. W—, Case 16, reported by Elliotson in the 'Medico-Chirurgical Transactions' for 1833, while the stools are described as without the least appearance of bile, it is mentioned that the urine was pale, from which it may be inferred that there was no jaundice. A case is reported by Dr. James Kilgour of a suppurating cyst of the pancreas, in which the gland was converted into a single sac containing purulent fluid; during life the stools were described as containing no bile, but post mortem the liver was found to be normal. And to show how even the most careful modern observers have ignored such facts, I will point out that Senn, the performer of a most valuable series of experiments, and author of an exhaustive essay on the surgery of the pancreas published in the 'Transactions of the American Surgical Association,' in commenting on this case and on the probability that it would now have been correctly diagnosed, fails to note

[1] The author of an essay entitled, 'Études sur les Maladies du Pancréas.'

the character of the stools, which were really, in the absence of signs of disease of the liver, diagnostic of pancreatic disease.

As this paper must necessarily be limited in length, I am unable to single out further those published cases which support my views, but a careful study with an open mind of the records of pancreatic disease will show that these cases are numerous, and I feel certain that so soon as the profession is freed from the false idea that decolourised stools in all cases imply disorder of the liver, many cases will be observed and reported, confirming the axioms which I have laid down.

I now pass to the fact accepted by physiological chemists that the meconium does *not* contain hydrobilirubin, while bilirubin and its derivative biliverdin are present.

This supports the view that the former brown pigment is produced by the action of the pancreatic fluid on the bile; for while it is known that the liver secretes bile in the fœtal state, it is known also that the pancreas is a gland which does not act until after birth, and that therefore the bile constituents found in the intestines at birth cannot have been exposed to the action of the pancreatic fluid. As bearing directly on this point, I must refer to Case 8, reported by Claude Bernard in the paper previously referred to. It is that of a child six years old, in whom after death the pancreas was found diseased throughout, with the exception of two small, apparently healthy, patches; the motions are described by Bernard as having the appearance and consistence of meconium.

As pertinent to the question, I may be permitted very briefly to allude to "icterus neonatorum." The variety in the causes assigned by divers authorities is evidence that as yet no one fully satisfactory explanation of this condition has been given, but assuming as proven the part played by the pancreas in converting the absorbable bilirubin into non-absorbable hydrobilirubin, we have the following data for coming to a conclusion as to the cause of the jaundice of new-born infants:

1st. Unchanged bile is absorbed into the blood in its passage through the intestines, and an excess of bile in the blood beyond what can be dealt with by the eliminating organs will cause jaundice.

2nd. At birth the intestinal tract is charged through its whole length with meconium containing absorbable bilirubin and biliverdin.

3rd. The liver is actively secreting bile during fœtal life and immediately after birth; and the bile passes into the intestines.

4th. The pancreas is a gland which acts only after birth and under the stimulus of food.

5th. Until the pancreas becomes active, there will be an excess of unchanged bile in the intestines, and so soon as absorption sets in the blood will be liable to become charged with an abnormal amount of bile, which, if not eliminated as rapidly as absorbed, will cause jaundice.

The next point to which I shall allude in support of my deductions is the action of reputed cholagogues. Practical physicians find that certain of these remedies cause dejections copiously charged with the brown pigments, which are known to be derived from the constituents of bile; and they find further that these drugs relieve symptoms which are attributed to the presence of bile in the blood, or to a liver evidently suffering from its inability to perform the functions devolving on it. On the other hand, physiologists tell us that their experiments prove conclusively that, at all events in animals, these same drugs have little or no effect in increasing the secretion or excretion of bile by the liver. Of this discrepancy there can be no doubt, and to reconcile the conflicting testimony it has been suggested that the so-called cholagogues exert their beneficial effect by hurrying the bile through the intestinal tract—giving no time for its absorption, and compelling its expulsion with the dejecta; but even those who make this suggestion must be aware that it is fallacious. If the hurrying-on theory is worth anything, why have calomel and other preparations of mercury, sulphate of soda, and the mineral

waters containing this and other similar salts a reputation as cholagogues, while such rapidly-acting aperients as castor-oil, gamboge, colocynth, elaterium, and others have none? And why are the stools a dark brown instead of the bright yellow, which they should be if the bile were hustled through from the liver to the anus unchanged? But if we accept the fact that while unaltered bile-pigment is absorbed, that only which has been acted upon by the pancreatic fluid remains unabsorbed and passes off with the fæces, then it follows that remedies which increase the activity of the pancreas and facilitate the reaction between its secretion and the bile will, by converting the absorbable bilirubin into the non-absorbable hydrobilirubin, lead to the passage of stools charged with the latter; and, by preventing the entrance of bile from the intestine into the blood, they will relieve the patient of the symptoms caused by bile in the circulation, and will take from the liver the duty of eliminating the re-absorbed bile, leaving it only to excrete *pari passû* with secretion.

It is by the results of their experiments on animals that physiologists have unsettled our views on the action of cholagogues, but taking as an instance of these drugs calomel, it is no mere assumption to say that in animals this drug, which acts so powerfully on the salivary glands, acts similarly on the analogous gland, the pancreas; for it is proved, by the large quantities of leucin and tyrosine found in the fæces of dogs after calomel has been administered, that it acts on the pancreas of those animals. If we assume that its action on the human pancreas is similar, the discrepancy between clinical observation and physiological experiment ceases to exist, and the empirical use of remedies is once more justified on scientific grounds.

The physician says that calomel relieves the symptoms caused by an excess of bile in the blood, and eases the over-burdened liver. The physiologist says that calomel has little or no action on the healthy liver, and that it promotes neither the secretion nor the excretion of the bile by that organ, though (in the dog) it acts on the pancreas.

Accepting these facts, the physician explains his results by the action of the drug in increasing the pancreatic fluid in the intestine, and thus furnishing the material for that reaction which forbids the absorption of bile into the blood and ensures its extrusion in the excrement.

Lastly, in support of my views I must revert to what I said, in introducing the subject, as to the observation of cases in which colourless stools are a permanent symptom, but from which every other indication of disordered liver is wanting. There are few practitioners of large experience who have not felt the need for an explanation of these cases. Such an explanation is afforded by the new facts in reference to the functions of the pancreas to which I have drawn your attention.

These cases are not rare, and since I have been aware of the part played by the pancreas in the excretion of the bile I have in several instances experienced the value of the knowledge as an aid to diagnosis. At the very moment that I am writing this paragraph I am returning from seeing with a colleague a patient who has an epigastric tumour and almost colourless stools, but whose urine and conjunctiva show not the slightest tinge of bile colouring, a combination of symptoms which to me would be inexplicable did I not know that bile is absorbed from the intestines, and does not show in the fæces unless acted on by the pancreatic fluid. Within the last few days a medical friend mentioned to me that he had made a post-mortem examination in which he found cancer confined to the pancreas. In reply to my question whether he had observed anything peculiar in the motions during life, he said, "Nothing but a deficiency of bile," by which he meant colourless stools. But this patient had no persistent jaundice accompanying the colourless stools.

To recapitulate, I ask you, in the first place, to note the prominent facts of the two cases which to my mind conclusively prove the action of the pancreatic juice on the bile pigment, and its controlling influence over the absorption of bile from the intestine by the conversion of more

or less of the fluid into hydrobilirubin, the brown colouring matter which is expelled with the fæces; and, in the second place, to note that these conclusions are supported:

1st. By the clinical records of other published cases, when these are examined by the new light afforded by my two cases.

2nd. By the physiological facts as to the condition of the bile in the intestines of the new-born infant.

3rd. By the explanation which these conclusions afford of the discrepancy at present existing between the results of clinical observation and experimental physiology on the action of so-called cholagogues.

4th. By the explanation afforded of cases constantly observed in which no bile appears in the fæces, although there is evidence that the secretive and excretive functions of the liver are being perfectly performed.

On the practical bearing of the facts I have brought forward it is not necessary for me to enlarge. If my conclusions are accepted not only must their value in the diagnosis and consequently the treatment and prognosis of pancreatic disease be evident, but also it must be clear that the knowledge of the controlling influences of the pancreas on the elimination of the bile will materially assist us in the treatment of the whole class of maladies which we may include under the head of bilious derangement. In every case in which a colourless state of the stools is observed, we must look to the presence or absence of other symptoms to determine whether the case is one of hepatic or of pancreatic disease; and in the treatment of all disorders in which a diminution of bile in the blood or lightening the work of the liver is indicated we must seek such remedies as will, by stimulating the pancreas, increase the formation of hydrobilirubin and its expulsion with the fæces.

Although I cannot expect the profession to accept these views, novel as they are, without careful consideration of the facts on which they are grounded, I bring them forward with more confidence because in studying the

writings of such workers as Lauder Brunton, Harley, Legg, Senn, of Claude Bernard and other foreign authors, it appears to me that they are all tending towards the discovery of the facts which I regard as established by the cases I have recorded. And I trust that the judgment of the distinguished Society, to which, through the kindness of Sir Andrew Clark, I am enabled to make this communication, will be such that I may hope to see other more able men than myself take the subject up, and, working at it in a wider field, add fresh facts to those which, with the conclusions I have drawn from them, I have now laid before you.

(For report of the discussion on this paper, see 'Proceedings of the Royal Medical and Chirurgical Society,' Third Series, vol. i, p. 98.)

THE CAUSATION AND PATHOLOGY

OF THE MORE COMMONLY OBSERVED FORMS OF

LATERAL CURVATURE OF THE SPINAL COLUMN.

BY

W. ARBUTHNOT LANE, M.S.,

ASSISTANT SURGEON TO GUY'S HOSPITAL, AND TO THE HOSPITAL FOR SICK CHILDREN, GREAT ORMOND STREET.

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In this paper I hope to succeed in showing that the large proportion of the cases of lateral curvature which come under the observation of the surgeon are due to the habitual assumption of attitudes of rest by young subjects who are wanting in vigour. This group is produced in the same manner as are the simple deformities which develop in young life, namely, knock-knee, flat-foot, dorsal excurvation, &c. These I have discussed in previous papers.[1]

There exists a larger proportion of cases of lateral curva-

[1] "The Causation, Pathology, and Physiology of several of the Deformities which develop during Young Life, including Simple Knock-knee, Flat-foot, Lateral Curvature, Dorsal Excurvation, Deformities of the Toes, a Form of Facial and Thoracic Deformity due to Large Tonsils, and Rickety Deformities of the Spinal Column, Pelvis, and Lower Extremities," 'Guy's Hospital Reports,' 1886, 1887. "A Brief Statement of the Causation of the several Simple and Rachitic Deformities that develop during Young Life," 'Brit. Med. Journal,' Jan. 26th, 1889.

ture which are not produced by the habitual retention of the column in the easy erect posture than of those other deformities, for the reason that asymmetry of this portion of the skeleton is of necessity brought about in carrying any load by one arm or by supporting a load upon one half of the thorax, and the habitual repetition of such an act soon renders the column permanently asymmetrical.

We know that the curves in an antero-posterior plane occupied by the bodies of the movable vertebræ are to a very great extent evolved during the lifetime of the individual in consequence of the assumption of attitudes of activity and rest, and that any interference with one of the curves in an antero-posterior plane, as in the case of caries, is followed by an alteration in the form of the other curves. In the active postures there is a constant tendency to the diminution of the several convexities, while in the easy attitudes the reverse is the case.

The result of the habitual exercise of the active erect posture is seen in those labourers who carry loads of only moderate weight upon the head. In such cases the curves in an antero-posterior plane are rendered much less convex than they are in the normal type.

In feeble old age, in which the trunk assumes only attitudes of rest, the reverse condition is seen to great advantage, the curves being rendered remarkably more convex.[1] The same exaggerated convexities are seen in the young subject who habitually retains the column symmetrically in an attitude of rest.

In infancy the form of the bodies of the vertebræ, of the fibro-cartilages, and of the curves which develop later does not exist. In the active erect posture the plane of the facet upon the upper surface of the sacrum is placed very obliquely, so that it looks forwards and upwards, and it is upon this inclined plane that the superjacent bodies of the vertebræ and fibro-cartilages are placed, and connected to them are the cranial, thoracic, and abdominal walls, con-

[1] "The Causation and Pathology of Rheumatic Arthritis and of Senile Changes," 'Trans. Path. Soc.,' 1886, and 'Guy's Hospital Reports,' 1886, 1887.

tents, and appendages, all of which exert upon the column a pressure in a downward direction in front of their transverse axes of rotation. The formation of the lumbar convexity is determined of necessity by the plane of the sacral facet, while the cervical and dorsal curves are also influenced by the presence of the thorax, &c., in their formation.

It is apparent that as the spinous processes and laminæ occupy a median position, and as they lie behind the transverse axis, around which each vertebra rotates, they can only serve to influence the amount of this rotation, or, in other words, to limit flexion and extension of the several portions of the spinal column.

As it not uncommonly happens that the lower extremities differ in length in the same subject to a considerable extent without any obvious reason, one would naturally expect that the lateral inclination of the plane of the sacral facet which must result from the rotation of the pelvis around an antero-posterior axis in the direction of the shorter limb must necessitate the formation by the vertebral discs and intervertebral fibro-cartilages of curves in a vertical transverse plane, the lower or lumbar curve forming a convexity directed to the shorter limb, the dorsal vertebræ presenting a convexity to the opposite side, and the cervical a convexity of the same direction as the lumbar. Yet in the vigorous child this is not the case. The advantage of retaining the column in an antero-posterior plane is obviously so great that as the child learns to walk, the powerful muscles inserted into the lumbar transverse processes and bodies drag the whole of the lumbar spine, which they retain fixed in an antero-posterior vertical plane, to one side upon the sacral facet, and so influence the growth of the last fibro-cartilage that it forms a wedge whose base is directed to the shorter limb. Should such a subject perform habitually such heavy labour as produces a rapid destruction of the greater portion of the fibro-cartilages in the lumbar region, the apparently necessary lateral curve is obviated by the conversion of the body of the last lumbar vertebra into a wedge shape, the base of

the wedge being, like the last fibro-cartilage which had been destroyed or reduced to a uniformly thin dense fibrous layer, directed to the shorter limb. Cases illustrating the energy with which the bodies of the lumbar vertebræ are retained in a vertical antero-posterior plane by the powerful muscles of the vigorous subject, even though the difference between the lengths of the lateral pelvic supports be considerable, are described in papers[1] in the 'Journal of Anatomy and Phpsiology.' I have illustrated these conditions diagrammatically in Figs. 1 and 2. I have also

FIG. 1.

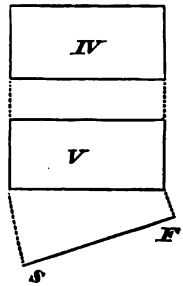


FIG. 2.

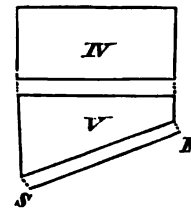


FIG. 1 represents a vertical transverse section through the lower portion of the spinal column, showing the lateral deflection of the plane of the sacral facet, S F, consequent on a considerable congenital difference in the length of the legs.

FIG. 2 represents a similar section. In this case the individual had carried very heavy loads on his back, and the fibro-cartilages are shown to be much thinned and indurated. IV and V represent the 4″ and 5″ lumbar vertebræ.

shown in the 'Guy's Hospital Reports,' 1886, that the same is true for acquired shortening in the vigorous subject.

We are aware that even in the vigorous child the total

[1] "A Remarkable Example of the manner in which Pressure Changes in the Skeleton may reveal the Labour History of the Individual," 'Journal of Anat. and Phys.,' April, 1887. "The Causation of several Variations and Congenital Abnormalities in the Human Skeleton," 'Journal of Anat. and Phys.,' July, 1887. "Can the existence of a Tendency to Change in the Form of the Skeleton of the Parent result in the actuality of that Change in the Offspring?" 'Journal of Anat. and Phys.,' Jan., 1888.

thickness of the intervertebral discs is markedly less in the evening than in the morning, and that this difference is more noticeable in the feeble subject in whom the fibro-cartilages are more compressible and less resilient than in the robust; also that this difference can exist without the presence of any deviation of the bodies of the vertebræ from a vertical antero-posterior plane. In the young subject the total thickness of the fibro-cartilages bears a greater proportion to the total thickness of the bodies than it does in adult life, and in the feeble child this proportion is still greater.

Let us now analyse the condition of the spinal column and its appendages while the child assumes the easy erect posture, supporting the greater part of its weight on one leg. In this attitude the pelvis is fixed upon the thigh in a position of extreme extension. (In this case, for the convenience of description and because it is the one more commonly used, we will assume the supporting leg to be the right one.) In consequence of this rotation of the pelvis around a transverse axis the downward and forward inclination of the plane of the facet on the upper surface of the sacrum is altered so as to look much more directly upwards than it does in the active erect posture. As the pelvis is also fixed in a position of extreme adduction upon the supporting thigh and has in consequence rotated through a considerable angle around an antero-posterior axis, the plane of the sacral facet is inclined downwards and to the opposite side, its surface looking upwards and to the left. This considerable lateral inclination of the base upon which the superjacent column of bony and fibrous discs is placed determines of necessity the formation in a vertical transverse plane of a series of curves corresponding pretty accurately in their extent to the several curves in an antero-posterior plane. The convexity of the lateral lumbar curve is of course directed to the left.

Should this child have one of its legs longer than the other owing to some congenital condition or in consequence of some disease or injury, and should the longer leg be the

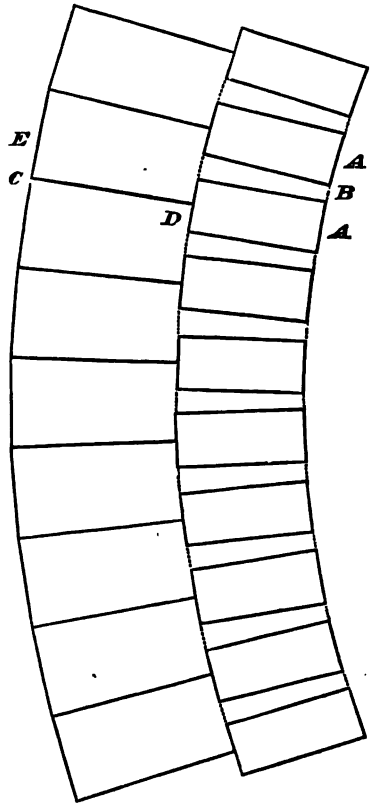
one on which he supports the trunk in this easy posture, the lateral inclination of the sacral facet to the opposite side will be much greater than in a subject whose legs are of equal length. Again the presence of a peculiarly formed and thick last fibro-cartilage will also serve to increase the convexity of the lateral lumbar curve.

It is therefore quite obvious that this temporary arrangement of the bony and fibrous discs in lateral curves during the retention of the body in this easy erect posture is dependent for its existence upon the same factors which determine firstly the temporary and subsequently the permanent arrangement of the antero-posterior curves and the characteristic forms of the several bony and fibro-cartilaginous discs, namely, the inclination of the sacral facet and the attachment of the several appendages.

I have already alluded to another factor which in this position assists in determining the formation of lateral curves. It is the rotation of the pelvis around a transverse axis, so that the plane of the sacral facet looks upwards rather than forwards and upwards, as it does in the active erect posture. This change in the direction of this surface causes a marked diminution in the anterior lumbar convexity. In fact it causes it to form a portion of a long single curve in an antero-posterior plane, the dorsal and cervical vertebræ entering into its construction. It is obvious therefore that if the spinal column is made to assume a resting attitude upon a symmetrically placed pelvis, as in all attitudes of repose, the bones and ligaments are made to perform the greatest possible share in supporting the body in such a posture, the expenditure of muscular energy being as small as possible. The resilient fibro-cartilaginous discs are sustaining very great pressure, and as this is much greater in their anterior segments than in the posterior, each cartilage forms a wedge whose base is directed backwards. I have attempted to indicate diagramatically my meaning in Fig. 3. A indicates the bodies of the vertebræ, B the fibro-cartilages, C D the spinous processes, and E the inelastic supraspinous and

interspinous ligaments which are rendered extremely tense.

FIG. 8.



It is easy to understand that if the plane of the sacral facet be deflected laterally, the compressed and resilient fibro-cartilages by their elasticity immediately alter their form so that each forms a wedge whose base is directed towards the side to which the sacral facet is deflected. By this means the mass of the fibro-cartilage escapes the general compression to which it was subject when the column was symmetrical, while that portion of the fibro-

cartilage which corresponds to the concavity of the lateral curve experiences a compression which is even greater than that sustained by the anterior portion in the symmetrical column. This more local compression is increased still more by the increased shortening of the arc of the segment by the development of a second curve, and by the absence of such resistance to the extreme compression of the lateral segment of the fibro-cartilage in the lateral curve as is afforded by the leverage of the spinous processes and the resistance of the inelastic and powerful interspinous ligaments in the symmetrically flexed column.

Again, while in the symmetrically flexed column the posterior portion of the fibro-cartilage is forcibly compressed, in the lateral curve that portion of the fibro-cartilage which corresponds to the convexity of the curve is situated to one side of the antero-posterior axis, around which each vertebral disc rotates, so that instead of transmitting pressure its fibres are in a condition of tension. I have attempted to illustrate this diagrammatically in Fig. 4.

It is apparent from a careful consideration of the above-mentioned facts that the segment of the fibro-cartilage which in this resting attitude sustains the greatest amount of pressure is that corresponding to the junction of the antero-posterior and lateral curves. This in the case of a curve having its convexity to the left would be the right antero-lateral segment, and it would be at this point that temporary and later permanent changes would ensue in the thickness and density of the fibro-cartilage, and where still later the bony margins of the discs would form dense lips of bone, which may adhere to one another. Again, it is at these points that the rate of growth of the epiphysial lines would be diminished below the normal rate and extent, while in the same proportion would the rate of growth of the epiphysial line in the opposite segment be increased, since it is habitually exposed to strain in the permanent lateral curve, while in the large majority of the movements of the normal spine it sustains pressure equal to that on the opposite side.

We see then what an important factor is the resiliency and elasticity of the fibro-cartilages in determining the formation of the lateral as well as of the antero-posterior

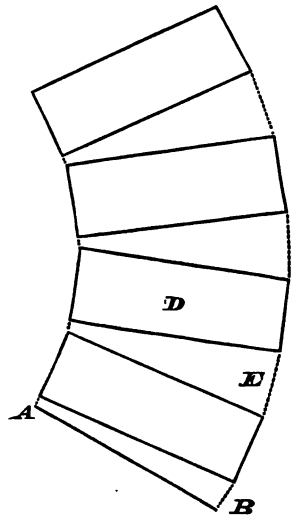


FIG. 4 represents a vertical transverse section through the bodies of the lumbar vertebræ in a case of lateral curvature, A B indicating the lateral inclination of the plane of the sacral facet; D represents a body, and E a fibro-cartilage.

curves, and the greater breadth and thickness of the bodies and fibro-cartilages in the lumbar region renders its illustration still more apparent in that portion of the column. In symmetrical flexion of the column the bodies of the vertebræ rotate around a transverse axis.

Now, if the vertebræ and fibro-cartilages alone were arranged in a vertical line upon a sacral facet occupying a horizontal plane, the upper extremity of the column being retained in the same vertical plane, any lateral deflection of the sacral facet would result in the formation by the column of a lateral curve in a vertical transverse plane, each vertebral body rotating around an antero-posterior axis which passes through its centre, and the line formed by the

apices of the spinous process would occupy the same antero-posterior vertical plane as that formed by the centres of the bodies of the vertebræ.

Therefore when this erect posture of ease is assumed the bodies of the vertebræ rotate around an axis in a horizontal plane, the direction of this axis being between that of the transverse and of the antero-posterior axis, its exact direction depending upon the various degrees of inclination of the plane of the sacral facet laterally and antero-posteriorly. Roughly, we may consider the axis in an antero-posterior plane around which each vertebra rotates as occupying a varying position between the axes above referred to, and being directed obliquely forwards and outwards.

It is apparent, from an examination of the articulations of the articular processes of the several vertebræ, that they readily permit of a considerable amount of rotation of the body of each vertebra around an axis in a horizontal plane and having this oblique direction. This explanation of the mechanism of the movement seems to me to be both obvious and readily capable of demonstration. As the axis of rotation is directed forwards and outwards, it of necessity follows that in this resting posture the line formed by the apices of the spinous processes lies much nearer the median line of the body than does the line formed by the centres of the bodies of the vertebræ. This circumstance, namely, that these two lines are not in exactly the same antero-posterior plane in a lateral curve seems to have constituted a great stumbling-block in the way of those pathologists who have devoted any attention to the subject, and many hypotheses, both remarkably complex and obscure, have been put forward to explain a movement which, till it becomes permanent and forms a deformity, is normal and its mechanism physiological.

Having satisfied ourselves as to the mode in which the temporary and permanent lateral curves of the spinal column are brought about, let us consider the influence which the deviation of the bodies of the vertebræ from a

median plane exerts upon the structures connected to them. If we examine a young subject who is supporting himself in this erect attitude of rest upon his right thigh, we are able to make out a greater resistance to the left of the middle line. We find that the transverse axis of the thorax occupies an oblique position, being directed forwards and to the left. The left shoulder is displaced forwards and the right backwards, the outline of the right scapula being much more obvious than that of the left. At the same time the right half of the chest appears to be more expanded than the left, the intercostal spaces in the former being apparently wider than in the latter. This is all obviously consequent upon the existence of the lateral dorsal curve, and upon the mode of connection of the ribs to the spinal column.

Since this rotation of the thorax is produced by the leverage exerted upon each vertebra upon each pair of ribs, it is obvious that the resistance offered to this force by the ribs must be felt as strain chiefly at two points, namely, about the angles of the ribs which lie on the side of the convexity of the lateral curve, and about the anterior extremities of the ribs which are connected with its concavity. Therefore should this resting posture become fixed and subsequently exaggerated owing to its repeated and habitual assumption, it is at these points that we would expect to find, and do find in the young growing child, more or less marked projections which are formed by the more or less abrupt yieldings of the ribs under the influence of this pressure. The knowledge of the manner in which this attitude of rest in the erect position is brought about, and especially of the very important part played by the compressibility and resiliency of the fibro-cartilages, enables us to understand very readily the practically insuperable obstacles which oppose the removal of the deviation when it has become permanent and constitutes a deformity. As long as the condition remains a physiological one, that is, as long as the compression sustained chiefly by the antero-lateral segment is removed by rest in the horizontal posture

or by the retention of the column in the symmetrical position by the expenditure of muscular energy, it is only of interest to the anatomist as illustrating a portion of the somewhat complex physiology of the spinal column. But when this segment has sustained such prolonged pressure as to render it unable to recover its normal thickness by rest, we find that clinically we have no effectual mechanical means of restoring the bodies of the vertebræ to the median line. All we can do is to render the organism more vigorous and robust, and by that means, while improving the density of the osseous and ligamentous tissues generally, the powerful spinal muscles are made sufficiently powerful to prevent further rotation of the bodies of the vertebræ.

In the case of simple knock-knee in an early stage, we can readily open out the diminished external femoro-tibial angle by the pressure exerted by an outside splint, causing a more rapid growth of bone along the outer portions of the epiphysial line and diminishing the rate of growth along the inner portions. But here we have only to treat rotation around an antero-posterior plane, and we are able to apply pressure directly at an immense mechanical advantage.

To remedy the acquired asymmetry of the lumbar vertebræ in the same effectual manner, we would require to use some force which would cause a sufficient rotation of each vertebral body around the oblique axis in a direction the reverse of that in which it has rotated to assume its asymmetrical position, in order to expand the compressed segment of fibro-cartilage, and to shorten that which has been over-extended. It is at once apparent that we are unable to apply force in this manner. We can, by inclining sufficiently the plane of the sacral facet to the opposite side by such means as raising the level of the plane of the sole of the foot on the side of the convexity of the lumbar curve by a thick sole, tend to displace the lateral curve formed by the bodies of the lumbar vertebræ to the opposite side, yet it is apparent from an examination of Fig. 5 that even if we did succeed in doing this we would not succeed in so altering the conditions of pressure and tension in the

several segments as to effect this purpose. Such a method could only be of service in remedying conditions which are but slightly in excess of the physiological and normal.

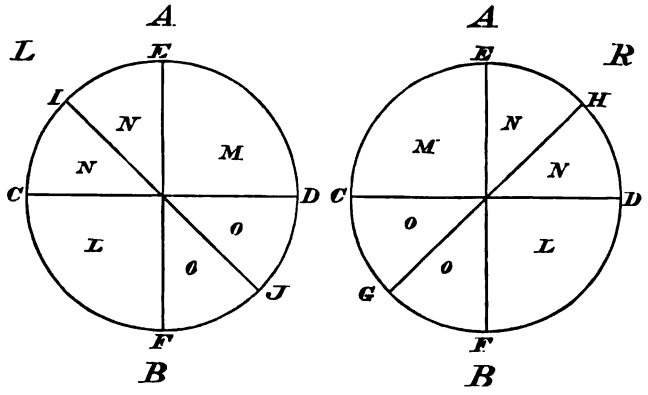


FIG. 5.—E and L each represent a vertebra, A being the anterior and B the posterior surface. C D indicates the transverse axis around which each body rotates in flexion of the column in an antero-posterior vertical plane. E F indicates the antero-posterior axis around which each vertebra would rotate were the column formed solely of vertebræ and discs placed upon a horizontal sacral facet whose plane was deflected laterally. G H represents diagrammatically the oblique antero-posterior axis around which each vertebral body rotates in forming a right lateral curve, and I J the oblique axis around which each body rotates in forming a left lateral curve. M indicates the segment of intervening fibro-cartilage which sustains the greatest pressure, and L that which sustains the least. The segment of fibro-cartilage N sustains greater pressure than that marked O.

Since in many of the sedentary attitudes of rest which are so frequently assumed by the feeble young subject considerable lateral inclination of the sacral facet is very usually, in fact is always, associated with a very marked degree of flexion of the spine, especially in the lumbar region, it is easy to understand that the deformity which is first the fixation and subsequently the exaggeration of a normal physiological attitude may result as readily in these sedentary postures as we have seen it develop in the easy erect posture.

I do not intend to render this paper tediously long by

discussing the causation and pathology of the less frequently observed cases of lateral curvature, which are due to carrying loads asymmetrically upon the thorax or by means of one arm or shoulder, to the forcible approximation of the ribs on one side due to extensive pleural adhesions and fibroid change in the lung, to contraction of the sterno-mastoid, &c., as I have gone into them very thoroughly in previous papers.[1] In connection with this portion of the subject I would refer the reader to a very interesting experimental research by Dr. L. von Lesser.[2]

I have limited myself in this paper to attempting to explain briefly, and I trust clearly, the causation and pathology of the very large proportion of the cases of lateral curvature which come under the observation of the surgeon, and whose treatment of which, except in the very earliest stages of the deformity, can, unfortunately, not be more than palliative, by which I mean that he can only oppose the progress of the deformity, and to do that he must expend much patient skill and energy. He cannot hope to again render the column symmetrical.

[1] "Three Forms of Spinal Deformity," 'Med.-Chir. Trans.,' 1884. "Some Points in the Physiology and Pathology of the Changes produced by Pressure in the Bony Skeleton of the Trunk and Shoulder Girdle," 'Guy's Hospital Reports,' 1885, 1886. "Some Changes in the Form of the Acetabular Cavities, Spinal Column, and Joints of the Hand, illustrated by the Anatomy of the Charwoman," 'Guy's Hospital Reports,' 1886, 1887, and other papers in the 'Journal of Anatomy and Physiology,' &c.

[2] "Experimentelles und Klinisches über Skoliose," Virchow's 'Archiv für pathologische Anatomie und Physiologie und für klinische Medicin,' 113 Band, 1888.

(For report of the discussion on this paper, see 'Proceedings of the Royal Medical and Chirurgical Society,' Third Series, vol. i, p. 107.)

TWENTY-FIVE CASES

OF

NEPHRECTOMY BY ABDOMINAL SECTION.

BY

J. KNOWSLEY THORNTON, M.B., C.M.,
SURGEON TO THE SAMARITAN FREE HOSPITAL, ETC.

Received January 4th—Read April 9th, 1889.

The completion of a series of twenty-five cases of nephrectomy, all performed by the abdominal method, seems to me to be worthy of complete record, and of careful consideration and discussion by the Fellows of the Royal Medical and Chirurgical Society. In 1877 I had the honour to bring before this Society a record of my first twenty-five ovariotomies, with a mortality of seven, or 28 per cent. In the same year Sir Spencer Wells recorded 300 additional cases of ovariotomy, with a mortality of eight, or 32 per cent. in the first twenty-five of the series, and with a mortality of 25·66 per cent. on the whole number. I recall these facts because in this first series of twenty-five nephrectomies I have only to record five deaths, or a mortality of 20 per cent., and this, as I shall show later in my paper, does not represent the true and lowest mortality to be expected in future series. The various recent writers on the surgery of the kidney give the mortality of the operation (lumbar and abdominal taken together) as from 45

to 50 per cent. Greig Smith, in the last edition of his 'Abdominal Surgery,' says at p. 542, "The results of individual operators of experience are more favorable but not strikingly so. Under the most advantageous circumstances, a general primary mortality may be expected, in all cases of nephrectomy, of something over 40 per cent."

The results which I am able to record by the abdominal method, which has hitherto had the discredit of being more fatal than the lumbar, therefore at once reduce the mortality by one half, and I do not hesitate to prophesy that the next series will be at least as successful again, and reduce it by another half.

In other words I believe that nephrectomy by abdominal section, in competent hands, will be as successful as ovariotomy. This is very remarkable, when we consider the functions and anatomical relations of the kidney, and contrast them with those of the ovary, and more so when we consider the number of simple cases of ovariotomy, and the almost entire absence of simple cases of nephrectomy, diseases which are of sufficient gravity to justify the removal of so important an organ as the kidney almost of necessity leading to grave changes in its relation to surrounding organs and structures.

I have arranged the cases in a tabular form, so that all the most important features can be seen at a glance, and I now without further preface pass to the details of the individual cases which I think worthy of note.

Case 1 was undertaken when the subject of renal surgery had been but little written upon, and when there was nothing to guide one in the details of the operation. I had previously verified the diagnosis by puncture, a method which I should not now think of employing, and I have little doubt that the case was one of congenitally impervious ureter, so that the disposal of the remains of this duct did not present itself for my consideration in this my first case.

I do not propose to enter into details of the first eight cases in my Table, because they are already published in

the records of the International Medical Congress held at Copenhagen in 1884. But I quote the following words from my paper, p. 148, because this is a subject to which I shall particularly refer in my concluding remarks:—"She seemed to me to be too ill to venture upon nephrectomy, but with a wider experience I am convinced that I only added to her risk and prolonged her suffering by performing nephrotomy instead of nephrectomy;" and again, p. 151, "I need only say that she was far less ill after the nephrectomy" (*i. e.* than after the nephrotomy) "and rapidly regained her strength."

Cases 3 and 8 deserve to have attention recalled to the fact that the former had a kidney turned into an enormous abscess containing twenty pints of pus, with a sac weighing four and a half pounds, by the impaction of this small stone, which I show you, in the mouth of the ureter (compare with Case 19), and that the latter had a large subperitoneal fibro-myoma removed from the uterus at the same operation, the kidney in this case also being represented by a mere thick-walled abscess, these minute calculi being present in enormous numbers, and blocking the ureter.

Case 7 also deserves note as a case of very large but slow-growing sarcoma of the capsule, the kidney itself and ureter being quite healthy. For the opportunity of showing to the Fellows this and other preparations I am indebted to the courtesy of the curator of the Museum of the Royal College of Surgeons. The patient remains in excellent health.

The line drawn across the Table of Cases divides those now published for the first time, seventeen in number, from those brought before the Copenhagen Congress.

Case 9 was interesting from the combination of calculus and papilloma, as the cause of the hydronephrosis. I show you the specimen from the College Museum, and a rough-coloured drawing of the appearance of the fresh specimen, which I made at the time. It was also shown at the meeting of the Pathological Society November 18th,

1884 (*vide* 'Trans.,' vol. xxxvi, p. 269.) Cases 10 and 11 were also shown as card specimens on the same evening (pp. 267, 271). This patient was thirty-two at the time of operation, and had suffered from pain in the right renal region since she was eight years old, and it seems extremely probable that this long-continued irritation led to the formation of the papilloma, and then the complete block caused by the combination of calculus and papilloma led to the hydronephrosis.

The only fact worthy of note in an otherwise smooth convalescence, is that the urine became ammoniacal and offensive on the eighth day, and then dropped in quantity by a third for several days, afterwards rising steadily till she was passing three and a half pints in the twenty-four hours, when she left the hospital, the minimum and maximum quantities being respectively fourteen and a half ounces and sixty-nine ounces.

Case 10 was one of the most difficult operations in the series, in consequence of the very dense and firm adhesions, and about three inches of the colon were entirely separated from the mesocolon. I was eventually obliged to enucleate the kidney from its capsule, breaking it in many places so that pus and putty-like material escaped, and fouled the wound, but I managed to confine all the mess to the capsule, and there was no fouling of the peritoneum. The ureter and vessels were bedded in tissue like cartilage, so that the latter were very difficult to secure, and I had simply to cut through the ureter and leave its open end free in the capsule. Having thoroughly cleaned out the sac with strong iodine and water, I sewed its opening to the edges of the parietal peritoneum, thus entirely shutting it off from the peritoneal cavity, and drained it by a glass tube. The patient made a slow but smooth recovery, the drainage lasting for seven weeks. I heard from Mr. Taylor, of Guildford, who sent her to me on December 8th of this year, that she has remained in excellent health, and is able to do her work as lady's-maid well.

Case 11 was one of hydronephrosis for which no cause was discovered; the cyst was so thin and adherent that in many places I had to scrape it away. There were nearly nine pints of urine in it, pale, rather cloudy, faintly acid, sp. gr. 1008 and with a trace of albumen. The urine drawn from the bladder just before the operation was clear and bright, acid, sp. gr. 1022, and contained some triple phosphates, and a considerable quantity of albumen.

The urine became ammoniacal and offensive on the thirteenth day. Dr. Walker, of Peterborough, reports that she is now in good health.

Case 12 was my first fatal case, a young Spanish lady, æt. 25, wife of a Spanish Prefect. She came to me with a large semi-solid tumour in the right side of the abdomen, which I diagnosed as renal. There were other small swellings in the parietes, and the whole condition suggested malignant disease. I was most unwilling to operate, but she begged so hard for a chance, and it seemed so cruel to send her back unrelieved, that I consented to explore, and found the tumour so mobile that I was encouraged to go on, but when it was too late to stop I found that the growth, a cysto-sarcoma, had penetrated the diaphragm and right pleura, and the latter was extensively opened. I got her into bed alive, but she only lived a few hours. It was clearly a case which should not have been operated upon, and the failure should not be properly included in the mortality of nephrectomy. I may mention that its early growth was slow, and this made me hope that it might turn out to be, like Case 4, a sarcoma of the capsule. The main mass of the tumour was brain-like in consistence, infiltrated and stained with blood, and full of cysts of all sizes; the only trace of the kidney was the pelvis, which was lined with a fleshy villous growth, very like the malignant papillary growth found in some ovarian tumours. It was this growth which had penetrated the diaphragm, and was fungating in the pleura. It weighed ten pounds after much blood and fluid had drained away. The spleen and left kidney were both enlarged, lobulated,

and infected with what appeared to be similar growths. I was not allowed any examination after death.

Case 13 was also one of sarcoma of more rapid growth, with marked emaciation. It was small, only weighing one and a half pounds, and the patient was suffering so much pain that I decided to attempt its removal. There were no special difficulties in the operation, and everything was so dry at the end that I did not drain, but I had to make a counter-opening and wash out the sac and drain, the day after the operation, and she had a very narrow escape.

The growth was chiefly in the pelvis and calyces, and to some extent encapsuled, the kidney substance being pushed out and flattened, but not infiltrated. It had at one point, however, penetrated the capsule and infected the peritoneum, and I was very doubtful whether I got it all away at this point, and also whether I was quite clear of it where the renal vessels were divided.

She made a good recovery, but died in a year and forty days of recurrence, which appeared to start about the site of the pedicle.

I should have mentioned that bright blood was passed frequently in the urine, both in this case and in No. 12, but not in Case 4, in which the sarcoma was confined to the capsule. This is therefore an important point to attend to in cases of probable renal sarcoma, as a differential sign to distinguish disease of the capsule, from that of the lining membrane and substance of the kidney. In Case 21, though the capsule was chiefly involved, the disease had penetrated the pelvis of the kidney. There was no heredity to be traced in either of these cases.

Case 14, sent to me by Mr. Manley Sims, was one of simple hydronephrosis, and I could find nothing to account for the disease. The kidney substance had almost entirely disappeared.

I got a lesson from this case which is worthy of note. The ureter was fixed in the lower angle of the parietal incision, and, as it is apt to do if left at all loose, it pro-

lapsed a little, and when all the rest of the wound was soundly healed on the fourteenth day, I clipped it off, and had severe arterial hæmorrhage, which I had great difficulty in stopping, the artery, which was of considerable size, retracting into the firm tissue round the ureter. I have since noticed, that the vessel which runs along the ureter is often large and thin walled, if the ureter is healthy, and I am careful to ligature it, and not to interfere with the stump of the ureter afterwards. It generally sloughs off in ten days, but if it prolapses is sometimes much longer in healing over.

Case 15 was a very curious one, and deserves a more detailed notice. I first saw this young lady with my friend Mr. Edgar Barker in December, 1884, and heard that she had passed pus in the urine for many years, and had been seen by most of the leading consultants in London, at one time or another, but no definite diagnosis had ever been arrived at, and no treatment suggested had ever been of service. The pus was supposed, however, to come from the bladder. Upon making a bimanual examination, I detected a small swelling in the anterior cul-de-sac between the uterus and bladder, and thought this was most likely in some way the cause of her troubles. It was decided that Sir James Paget should be asked to join us in consultation, and that the patient should be placed under chloroform, and the bladder thoroughly explored. I performed rapid dilatation, and on passing my finger into the bladder found its walls everywhere smooth and healthy, but at the fundus, slightly posteriorly, the small swelling which I had previously detected bulged into the cavity to the size of a walnut. Sir James Paget also introduced his finger into the bladder, and verified its presence. We came to the conclusion that this swelling probably prevented the bladder thoroughly emptying itself, and possibly caused it to admit some air, and hence cystitis was kept up. It was decided that I should perform abdominal section, and if possible remove the growth. This I did on January 26th, 1885, but on introducing my

hand was greatly surprised to find that it was a displaced and adherent ovary. I scraped it away with some trouble and ligatured the broad ligament in the usual way. If I had not felt the bulge into the interior of the bladder which it caused, I should not have believed it possible that its mere adhesion in this situation could have made it so completely simulate a growth projecting more into the bladder, than into the peritoneum.

The patient made a good recovery, but the pus in the urine did not decrease. The only history to account for the position and adhesion of the ovary was, that when quite a little girl she had pitched forward over a low iron railing, and hurt her abdomen very much. She had all along complained of a good deal of pain along the left ureter and round towards the loin, but this had been regarded as secondary to the bladder affection.

It was now clear, however, that the bladder was healthy, and I became convinced that we must look to the kidney as the source of the pus. I advised another operation with a view to a thorough exploration of the condition of the kidneys, and the removal of the left kidney if it was found to be disorganised, and I was supported in this suggestion by Sir Joseph Lister, who saw the patient in consultation with Mr. Barker and myself.

I operated on March 1st, 1886, and found the left kidney full of pus and quite disorganised, and the ureter greatly dilated and full of little granular growths, which I believed to be tubercular. The kidney was removed, the ureter fastened into the parietal incision, and the patient recovered, and is now in better health than she has had since her early childhood, the urine quite normal. Dr. Percy Kidd kindly examined the kidney and ureter and reported it free from tubercle, the little growths in the ureter being simple granulomata, and probably the result of the prolonged suppuration and irritation. I am strongly of opinion that though the displaced ovary was not the active element in the case at the time I discovered and removed it, that it was originally at the

bottom of the mischief, as the drag upon the broad ligament in the early days of its displacement, and the inflammatory action round it, must have been an obstruction to the ureter from their anatomical relations.

The urine, which was frequently examined both before and after the first operation, always contained a great number of small epithelial cells and groups of small round-cells, which we thought must be from the kidney, but the bladder always having been considered the diseased organ, these evidences of renal irritation were supposed to be secondary.

The patient suffered for many months after the nephrectomy from troublesome nausea and vomiting after food, and this was only finally stopped by a visit to Ems in the following autumn.

Case 16 was that of a married woman, æt. 39, mother of thirteen children, who had suffered from symptoms of renal calculus for four years before admission into the Samaritan Hospital in April, 1886. During these four years she bore a dead child and two living children, both of them gradually emaciating and dying shortly after birth, without any very apparent cause. She was suffering constant and severe pain when she came under my care, and had a large and very tender swelling in the region of the right kidney. My diagnosis was calculus with suppuration and disorganisation of the kidney, and I advised its removal.

The operation was performed on April 17th, 1886, and I followed the plan which I had up to this time pursued with marked success, *i. e.* I enucleated a channel down to the renal vessels, before enucleating the main mass of the kidney, and secured them by the application of a large pair of Wells' curved pressure forceps. I had found this plan answer remarkably well in my other cases, the subsequent enucleation being easier because almost bloodless, and the loss of blood for the patient much less.

This was a very difficult case, the adhesions about the vessels and ureter being very dense and strong, and the

subsequent enucleation of the base of the mass very prolonged and difficult. Mr. Murray, who was administering the chloroform, warned me once or twice that the patient was very collapsed, but I thought she would rally as soon as the tearing and dragging was over, as patients so often do in these severe abdominal operations. After tying the vessels and cutting away the kidney, I removed the forceps, and was surprised with the alarming venous hæmorrhage which followed. While I was trying to find its source the patient died, the only case I have ever actually lost upon the operating table. Finding that she was past hope, I proceeded more leisurely to examine into the cause of the catastrophe, and then found that the renal vessels were adherent to the vena cava, and that in taking them up in the forceps I had included a V-shaped portion of its wall, the point of the V being cut, when the kidney was removed, and the gap thus made only partially closed by the ligatures. I have never again put pressure forceps on to the renal pedicle, except small pairs to secure individual and visible bleeding vessels, but I have again met with very extensive adhesion of the cava, and successfully separated it, as Case 18 will show.

This poor woman was in such a very feeble, emaciated, and anæmic condition that I much doubt if she would have recovered without this terrible accident, and I fear there will always be a few such cases to give the operation a certain mortality, because it is impossible in some cases to judge of the extent, and nature of these adhesions about the pedicle, until the operation is advanced beyond stopping, and the tissues forming these adhesions are the densest I have ever met with, except in some few cases of ovariotomy for the removal of ruptured and suppurating dermoid cysts.

Case 17, as will be seen by the Table, was also one of disorganisation of the kidney from calculus, and was also fatal. This is, however, one of the cases which I do not think properly swell the mortality of nephrectomy, for the patient became hemiplegic during the administration of the

anæsthetic, and never came out of this condition, and I heard afterwards, that she had recovered from a slight attack of the same kind a few months before I operated. Had I known this, I should have hesitated about operating, for the physical signs and history, which was a long one, led me to expect a long and difficult operation. The symptoms after the operation, certainly did not point to the abdominal condition as the cause of death, her temperature and pulse being respectively 100·8° and 108 shortly before the final collapse. I think if this case and No. 12 could be eliminated from my record, we should, with the three other fatal cases in twenty-three operations, obtain a fair idea of the mortality which may be expected in abdominal nephrectomy, at any rate in the hands of those who are accustomed to perform difficult operations in the abdomen.

Case 18 was one of tubercular pyonephrosis. The patient had suffered more or less constant pain for eighteen months, and pus had been present in the urine for about the same time. She was much emaciated and very weak, and stated that she had been steadily losing flesh and strength for about twelve months. The operation was a very difficult one, owing to the dense adhesions round the vessels and ureter. I had to tie the vessels after cutting them, as I could not detect them till they bled; I could not distinguish the ureter where it was cut away, and it was consequently left open in the capsule. I had to dissect out the vena cava for fully two inches, and it was entirely separated from all its attachments for this distance. The mass of tissue containing the cut end of the ureter was like cartilage, and stood up in the sac fully an inch from the bottom, so that I was able to pass the glass tube well below it, and thus give it a chance of sealing over, without its being wetted with the oozing and secretions in the sac, a very important matter in avoiding sepsis. She had a good deal of fever, and some diarrhœa after the operation, but made a good recovery, going home into Yorkshire quite well four weeks after the operation.

Case 19 was a very interesting one. She was brought to me by Dr. Crombie, of Brentford, and looked so much older than her age and so ill that I thought, as she crawled into my consulting room, "I should not care to operate on you, whatever is the matter." She had suffered for ten years from symptoms of left renal calculus, and had at times had a marked renal tumour, though there was no detectable enlargement when I saw her. Besides her renal trouble, she had a large recurrent cysto-sarcoma of the parotid, for which a partial operation had been performed by Mr. Marshall twelve years or more before I saw her. In spite of my fears operation was decided upon, and performed on April 23rd, 1887. I found a large and unhealthy kidney, but could not detect a stone, and was much puzzled, as the symptoms of calculus were so very decided, and the pain still severe. At last I found a minute angular calculus fixed firmly in the ureter, just at its entrance into the bladder. All attempts to move it failed, and the ureter being very thin I feared that I might rupture it. It was obviously impossible to cut the stone out in this situation, without great risk of flooding the peritoneum with the mixed blood, pus, and urine from the kidney, and I therefore decided to remove the kidney and leave the stone. The operation was a complete success, and she rapidly regained health and strength, so that when she came to me a year later, and asked to be relieved of the parotid tumour, I at once acceded to her request, and had another successful operation, the wound healing very rapidly by first intention. She still has her stone, but it does not trouble her, though knowing now where it is I can feel it *per vaginam*, and pressure on it causes pain to shoot up along the course of the ureter. I thought that it would, when relieved of the irritation and pressure from behind, very likely quietly find its own way into the bladder, but the ureter seems too fond of its old friend to relax its grip. The ureter was pinned out and no drainage was used.

Case 20 was that of a married woman with a large sup-

purating kidney, the pus having broken through into the loin tissues, and formed a large perinephritic abscess. The patient was very low and weak, and I doubted whether she would stand nephrectomy, and having by my experience in Case 2 learned that nephrotomy and drainage would probably make her worse, I aspirated and drew off a large quantity of pus, and sent her home to try and pick up a little strength. The pus, however, rapidly reaccumulated, and in a few weeks the local condition was as bad as ever, with no improvement in general condition. I therefore determined to give her the chance of nephrectomy. The operation was very difficult, a large ragged suppurating cavity, almost surrounding the kidney, and burrowing behind and up under the liver, the adhesions round the vessels being as usual very dense and hard. I washed out the sac and abscess cavities well with 1—2000 corrosive sublimate solution, and drained the former with a glass tube in front, and the latter with rubber tubes brought out through the thinned loin tissues. The discharge of pus from the latter was very free, soaking through everything, and though the temperature did not rise above 101·2°, and the abdominal condition was satisfactory, she steadily lost ground, and died of, I believe, mere exhaustion on the second day after the operation.

This is the sort of case that one will occasionally meet with, and it is from such cases that a certain percentage of mortality must, I fear, always be expected, at any rate until the operation of nephrectomy is better known to the profession at large, and cases come earlier to the surgeon.

Case 21 was one of sarcoma of the capsule, which had penetrated the pelvis of the kidney, weighing about three and a half pounds. The patient had suffered from pain in the right loin, and had occasionally noticed blood in the urine for fifteen years. After her second child was born, and during the last weeks of gestation, bleeding was almost constant. For the last two years there had been attacks of pain, followed by the appearance of blood in the urine and sickness. For a long time the lump was very mobile

and she could push it up under the ribs, but latterly it had become more fixed.

The operation was a long one, the adhesions being very close high up towards the diaphragm and liver, but I got the whole mass well away, and beyond the fact that the patient was very anæmic from the constant bleeding, I saw no reason why she should not do well. I drained with a glass tube. She, however, never rallied, the pulse steadily gaining in frequency, and losing in strength, till she died quietly twenty-four hours after operation.

I think this must be regarded as one of the deaths which we meet with after removal of malignant abdominal tumours, where the patients gradually sink without any very apparent reason.

I am glad to say this, the fifth fatal case, concludes my record of misfortune, the remaining four cases, though all rather above the average as to severity and difficulty of operation, having all made good recoveries.

Case 22 was that of a young married lady, æt. 34, seen first in consultation with my friend, Dr. George Johnson, and the late Dr. Richards, of Winchester. She had been long more or less of an invalid, but all her troubles had been supposed to be due to some disease of the left ovary. Menstruation began at thirteen, and was painless and regular till she was treated for ovarian disease, then she had amenorrhœa for two months, and this was followed by too great loss, and dysmenorrhœa. At this time her chief troubles were pain in the left iliac fossa and back, with too frequent micturition. From early childhood she could remember suffering from what she called a stitch in her left side, and this became markedly worse after living for seven and a half years in a damp house, and riding a great deal on a rough, pulling horse. Damp or overfatigue would always bring on pain. The urine, so far as she knew, had always been normal, till the commencement of the present illness some months before I saw her. She went to bed in her usual health, and woke suddenly in violent pain, "as if penknives were stabbing at the neck of

the bladder." The next day the pain travelled down into the left knee, and then pus appeared in the urine, and she had been steadily losing ground ever since.

One brother and two maternal aunts died of phthisis.

On examination I could detect no enlargement of the left kidney, but the right was distinctly enlarged, firm, smooth, and free from tenderness. We came to the conclusion that the left kidney was suppurating and much damaged, and that the right was enlarged from extra work.

On March 27th, 1888, in the presence of Drs. Johnson and Richards, I performed nephrectomy by Langenbüch's incision, removing with much difficulty a left kidney which was a mere bag of pus. The ureter was so adherent and diseased, that I was obliged to tie it low down in the loin, and in order to keep a drain up to it I brought the ends of the ligature out in the loin, placing a rubber drainage-tube alongside of them. The adhesions were very extensive, and included the omentum. The bladder end of the ureter was adherent to the left ovary, the latter being otherwise healthy, and easily separated from its abnormal attachment. I merely released it, and replaced it in its normal position. I cannot resist the impression that these adhesions were the result, and not the cause, of the gynæcological treatment. I drained the sac by a glass tube in the abdominal wound, as well as the rubber one in the loin, and both yielded a good deal of bloody discharge for some days.

The wound in the loin healed up round the ligature on the ureter, and every attempt to loosen it led to a kind of renal colic, with general constitutional disturbance, so I left it alone, and the ends of the dry silk still protrude from the skin, but without causing any discharge or inconvenience of any kind.[1]

The patient is now in good health.

Case 23 was one of large suppurating tubercular kidney (left), and the young lady was in such a weak and emaciated condition, that I hesitated much before attempting

[1] The ligature has now come away and the wound is quite healed.

its removal. She had a small patch in the lung on the same side, which was, to say the least, in a suspicious condition. There had been complete amenorrhœa for six months, chills and sweats, high evening temperature, quick pulse, and great loss of flesh and strength, with constant pain in the affected side.

The illness began with a severe chill in the previous autumn, but she thinks there may have been pus in the urine before this. There had certainly been spasms of pain in that side of the abdomen, and she had noticed that she was soon tired, and especially by standing.

The operation was performed on the 7th of July, in the presence of her medical attendant, Dr. Lock, of Tenby. It was very difficult, the dense cartilaginous tissue round the vessels and ureter, being continued over the aorta. The vessels were small, and were secured after division by running a fine needle and silk across their mouths in this dense tissue. The ureter was full of thick curdy pus, and much thickened and enlarged. I washed it out well with $\frac{1}{1000}$ corrosive sublimate lotion, and then secured its end in the edges of the peritoneal wound; it was too short to bring out to the skin surface. The sac was drained by two glass tubes, one deep in the loin and the other shorter beside the ureter. The patient made a good but slow recovery, commencing, however, to put on flesh and lose her anxious careworn look almost immediately after the operation. The other kidney appeared quite healthy, but she has since complained of some pain in it and is naturally uneasy. I hope, however, that it is only the strain of extra work which is troubling it. At Christmas she reports herself quite well.

Cases 24 and 25 are so exactly alike as far as the nature of the disease, the difficulties of operation, and the perfect and smooth convalescence, that they might be described as one. They, however, differ most markedly in their early history. Both kidneys and stones are on the table to-night.

Case 24, a young widow, æt. 32, patient of Dr. Hamilton Bland, mother of one son about fourteen. Had a slight

attack of right renal colic during her pregnancy, and another more severe, eighteen months after the birth of her son. Had never noticed any blood in her water, and matter only in 1884; but her mother says that when she was a young girl, before marriage, the sister who occupied the same room used to complain of the water being very offensive. Enlargement was only noticed in April, 1888, attention being drawn to her kidneys by the passage of a small phosphatic calculus. She had suffered so little that it was difficult to convince her of the necessity for operation, though her urine was loaded with pus, and she was markedly losing health and strength. I operated on Nov. 21st, and having found the left kidney healthy, explored the right and found that its pelvis contained a very large stone, and that it was much thinned and sacculated, so I decided to remove it entirely in preference to attempting nephrolithotomy. The operation was difficult owing to the dense nature of the tissue forming the adhesions, but I managed to bring the ureter out and remove the whole mass without any previous puncture, a matter of the greatest importance I believe in these cases, whenever it is possible.

I drained with a glass tube in the abdominal incision, which was removed in twenty-six hours. The patient made a rapid recovery, beginning immediately to gain flesh and youthful appearance, and was up within the month with a soundly healed wound, only measuring two and a half inches.

In removing the stone from the kidney afterwards, one of the branches broke and remained in one of the calyces, and I think it very likely more damage of this kind would have happened, had I attempted nephrolithotomy. Moreover the kidney was so thoroughly disorganised, that I do not believe it would have ever recovered itself sufficiently to admit of the loin wound healing.

The only points in which Case 25 differs from the above are the age of the patient, 46, and the great suffering her disease had caused. She attributes her illness to poisoning while nursing a child ill with diphtheria, and

knowing as we do the important part played by the kidneys in the elimination of organisms in septic diseases, I think it is worth considering how far a kidney damaged by the presence of a stone, may have been thrown into active suppuration, during the elimination of diphtheritic organisms.

I am indebted to my old friend Sir Joseph Lister for this case, he having been consulted, and advised her medical attendant, Dr. Stiven, of Harrow, to place her under my care; and it is worthy of note that this and Case 6 among my nephrolithotomies, in which Sir Joseph Lister was also interested, along with Dr. George Johnson, are the two largest renal stones in my collection.

Whatever the cause, blood and matter first appeared in the urine after this nursing, but it was not till two years ago that she first noticed a lump on her right side. She has suffered very severely with pain and attacks of fever. For some time before admission the pus seemed to come sometimes through the bladder, and sometimes through the bowel. If the latter idea was correct, the pus must have found its way into the bowel somewhere low down in the ureter, for I found no communication between the bowel and kidney.

The operation was performed on November 28th, and the only difference between it and others already described was that the kidney was so high up under the ribs and so firmly fixed that I thought I could not get it out through Langenbüch's incision, and made an additional cut through the muscles outwards towards the loin. This certainly facilitated the operation, but I believe I could have done without it, and it has left a much less satisfactory scar, and exposed the patient to much greater risk of hernia. She has made a rapid and perfect recovery.

Briefly as I have sketched the above cases, there are many points of detail in history, operation, and after-treatment which I have been unable to dwell upon. I think, however, that they give a very fair picture of abdominal nephrectomy. Though my paper is already longer than

I like, I must call attention to some special features in the cases, and to the points which I consider of importance in such success as I have obtained.

I have obtained information up to date of writing this paper, either from the patients themselves, or from their medical attendants, in all but two of the cases. In my Copenhagen paper I reported Case 6 as a failure, pain having returned in the bladder and other kidney, a few weeks after the operation. I am happy now to be able to correct this report; the patient is in perfect health, and has married, and passed through pregnancy and labour without any trouble.

There are four cases of nephrectomy for hydronephrosis, and all are well. In a discussion on renal surgery which took place at one of the societies, I am not quite sure which, but I think our own, more than one speaker expressed pretty strongly the opinion that it was not justifiable to perform nephrectomy for hydronephrosis, without trying first what could be done by puncture, or nephrotomy, and drainage, and one surgeon spoke of having cured several cases by this latter method. I have never been able to find any records of such cases, but I determined to try incision and drainage in the next cases which I met with. I have now to report two; both have continued to discharge about the same quantity of urine through the loin tube for many months as they did immediately after the operation, and any attempt to remove the tube has been followed in both by immediate distension of kidney, with pain and constitutional disturbance. Both have the discomfort of wearing a urinal, and I am sure have wished as often as I have, that I had performed nephrectomy. Even if they now make up their minds to face another serious operation, I am quite sure that it will be much more difficult to remove their kidneys now, than it would have been at first, and much more dangerous into the bargain, for the adhesions will be firmer, and there will be difficulty in isolating the fistulous track, so as to perform a thoroughly aseptic operation. They have quite

settled for me the question of nephrotomy *versus* nephrectomy for hydronephrosis.

I am still strongly of opinion that it is bad practice to incise and drain by the loin a suppurating kidney, as a preliminary to nephrectomy. There are a few cases which may be cured by free and *early* incision and drainage, but they are rare. I have met with two, one already published in the Copenhagen paper, and another which I shall publish shortly with my other lumbar operations.

I am happy to say that I have not met with any of the evils which were to follow my method of dealing with the ureter, and I am more than ever convinced, that when it is possible to bring its cut end outside the external wound the main danger of nephrectomy is avoided. In every case in which I have been obliged to drop it, prolonged suppuration, or more serious troubles, have been the result.

Another very important point in abdominal nephrectomy is the removal of the suppurating kidney, whenever possible, without aspiration or tapping. It is extremely difficult so to close the puncture that one is quite sure that no escape and wound fouling takes place during the subsequent enucleation, and it is easier to enucleate the plump rounded mass than the collapsed sac. Of course there are some cases in which the accumulation of pus is so great that it is absolutely necessary to reduce the size of the tumour by aspiration. Such a case was No. 3 in my Table, in which there were twenty pints of pus, but they are rare.

Four of the cases were operated upon by the median incision, No. 1 because I did not then know of Langenbüch's method, Nos. 4 and 8 because I was not at all certain when I began the operations what tumours I had to deal with, and No. 15 because there was already the scar of the previous operation. In this case I found that the median incision much increased the difficulties of the operation.

In one Case, No. 5, I used the incision suggested by

myself, outside the reflection of the peritoneum on to the colon, but did not find that it gave any advantage, and the drainage-tube cut the outer part of the colon, and caused a fæcal fistula, which added far more to the danger of the operation, than the theoretical one of passing twice through the peritoneum. It will be seen that in my Table, in the column headed disease, I have used the terms pyonephrosis. calculous pyelitis, and calculous pyonephrosis. The use of the term pyonephrosis indicates that the cases were tubercular, or scrofulous as they are often called. I have already elsewhere expressed the opinion that these cases have not been sufficiently accurately described in our pathological text-books. I have certainly met with two very different conditions. In one the kidney is turned into a mere multiple abscess, the pus being more or less mixed with caseous material, and in the other the lining membrane of the pelvis and calyces is studded with little hard, raised tubercular growths, while the cavity is full of creamy pus, the kidney substance not being nearly so much invaded as in the other variety, a tubercular pyelitis. The one may be a later stage of the other, but they seem to me distinct.

I have used the term calculous pyelitis to describe the cases in which the substance of the kidney has been but little invaded by the suppuration, and the term calculous pyonephrosis to indicate that the kidney was practically destroyed.

The ureter was impervious in two of the cases which recovered; was fastened into the abdominal incision in twelve; was ligatured and left in the capsule, which was sewn into the parietal wound, in two, this treatment being practically extra-peritoneal; was simply dropped in two cases, in one ligatured and in the other not, and in the remaining case of the twenty recoveries the bladder end had been previously closed at the former operation of ovariotomy. In seven of the recoveries no drainage was used; one of them (No. 13) had to be reopened, and drained secondarily. In one case a rubber tube was passed right

through the abdomen and out in the loin, in two a rubber tube was used in front, in one through a counter-opening in the loin only, in seven a glass tube was used in front as in ovariotomy, in one two glass tubes were thus used, and in the remaining recovery a glass tube in front and a rubber tube through a counter-opening in the loin were both used.

My rule now is to drain, if I am in the least doubt, by the glass tube in front, clear it every twelve hours under the spray, and remove it in twenty-four to forty-eight hours if possible. If the sac is perfectly dry, if the kidney has been removed whole, and without any possible fouling of the wound, and if the ureter is pinned out, then I think the case will get well as quickly and safely without drainage as with it. But the three "ifs" are most important, and in a large proportion of the cases one or other of them fails.

I have already referred, in relation to Case 12, to the impropriety of operating in cases of large malignant tumours. I doubt also whether Case 13 really benefited much by the operation, for her sufferings with the recurrence were, if anything, greater than with the original disease, though the latter might have been much increased before the fatal termination had I not operated, and she had some months of fair health before recurrence. I think in an operation of this kind, which is as yet hardly established on a firm footing, we should always rather err on the side of over-caution, lest failures should so influence the general credit of the operation, as to cause it to be put aside in really proper cases. The mortality which has attended the operation so far, certainly seems to point to the probability that many cases have been operated upon which ought not to have been touched. I have refused to operate in a few cases, and have been the means of preventing operation in another case, and all these have verified my prognosis by speedy death, with extensive malignant disease.

The sarcomata which attack the capsule only are of slow growth, and as I have already pointed out, do not cause bloody urine. Probably in the later stages of their growth,

they break through their capsules, and invade the renal tissue, and may then cause hæmaturia, but probably also the time for their successful removal has then passed away, as in my own case No. 21.

It will be seen by the sex column in my Table that all the patients were females, and it may be questioned how far this fact has influenced the mortality, as there is, I think, an impression, that they bear abdominal operations better than males. I do not myself believe that there is any sound ground for this belief, and the only two male cases in which I have opened the abdomen and explored the kidneys before performing nephrolithotomy made excellent recoveries. I hope to record my results in nephrotomy, lumbar nephrolithotomy and nephrolithotomy by my own combined abdominal and lumbar section, in a subsequent paper, but I may mention that in these cases the mortality is only 10 per cent.

No.	Age.	Sex.	Condition.	Side.	Disease.	Date of operation.	Situation of incision.
1	7	F.	S.	Left	Hydronephrosis	Jan. 3, 1880	Median
2	26	F.	M.	Right	Pyonephrosis	March 11, 1882	Langenbūch's
3	58	F.	W.	Right	Calculous pyelitis with pus, 20 pints	March 15, 1882	„
4	53	F.	M.	Right	Sarcoma of capsule, 11 lbs.	Feb. 2, 1882	Median
5	42	F.	M.	Left	Ureter cut during ovariotomy, Feb. 15, 1883	July 28, 1883	Behind or outside colon
6	26	F.	S.	Right	Pyonephrosis	Nov. 4, 1883	Langenbūch's
7	28	F.	M.	Left	Ureter cut in attempting to remove a retro-peritoneal cyst, May 13, 1884	Immediate	„
8	49	F.	S.	Right	Calculous pyelitis	June 2, 1884	Median
9	32	F.	S.	Right	Calculous hydronephrosis	Oct. 8, 1884	Langenbūch's
10	48	F.	S.	Left	Pyonephrosis	Oct. 16, 1884	„
11	35	F.	S.	Right	Hydronephrosis	Nov. 7, 1884	„
12	25	F.	M.	„	Cysto-sarcoma	May 30, 1885	„
13	53	F.	W.	Left	Sarcoma	June 20, 1885	„
14	24	F.	S.	Right	Hydronephrosis	July 25, 1885	„
15	29	F.	S.	Left	Pyonephrosis	March 1, 1886	Median
16	39	F.	M.	Right	„	April 17, 1886	Langenbūch's
17	—	F.	M.	„	Calculous pyelitis	June 1, 1886	„

Treatment of ureter.	Drainage.	Result.		Remarks.
		Immediate.	Present.	
A mere fibrous cord	None	Recovered	Remains well	Probably congenital.
Fastened into abdominal incision	Rubber tube right through	,,	Lost sight of	Previous nephrotomy, Feb. 4, 1882.
,,	Glass tube	,,	Died May 7, 1885	Calculus found in other kidney, which was inflamed and suppurating.
Dropped in, and sloughing caused large deep abscess	Rubber tube in front	,,	Remains well	—
—	,,	,,	,,	—
Fastened into abdominal incision	None	,,	Has married and borne a child	Is quite well.
,,	,,	,,	Lost sight of	Much enlarged inferior mesenteric artery tied; occlusion of both femorals, followed with patches of gangrene on heels, toes, &c.
Could not be found	Glass tube	,,	Remains well	Large fibro-myoma also removed from fundus uteri.
Fastened into abdominal incision	None	Recovered	Remains well	Specimen in Museum of R. C. of Surgeons; shown at Path. Soc., Nov. 18, 1884.
Capsule with ureter in sewn up to incision	Glass tube	,,	,,	—
,,	,,	,,	,,	—
Fastened outside	,,	Died in a few hours	—	Tumour had grown through into right pleura.
,,	Secondary washing out and glass tube	Recovered	Died of recurrence July 30, 1886	High temp. and dulness in loin led me to reopen and wash out sac.
,,	Rubber tube out at back	,,	Remains well	Ureter prolapsed, and there was serious hæmorrhage from cutting it off on 14th day.
,,	None	,,	,,	—
,,	—	Died on table, injury to vena cava	—	I caught up a portion of the cava with Wells' large forceps along with the renal vessels, and have since abandoned their use in these cases.
,,	None	Died 4th day, hemiplegia	—	—

No.	Age.	Sex.	Condition.	Side.	Disease.	Date of operation.	Situation of incision.
18	48	F.	M.	Right	Pyonephrosis	Jan. 12, 1887	Langenbäch's
19	47	F.	M.	Left	Calculous impacted in ureter	April 23, 1887	„
20	42	F.	M.	Right	Pyonephrosis, with perinephric suppuration	July 22, 1887	„
21	42	F.	M.	„	Sarcoma of capsule, 3 lbs. 5 oz.	Oct. 19, 1887	„
22	34	F.	M.	Left	Pyonephrosis	March 27, 1888	„
23	—	F.	S.	„	„	July 7, 1888	„
24	32	F.	W.	Right	Calculous pyonephrosis	Nov. 21, 1888	„
25	—	F.	M.	„	„	—	„

Treatment of ureter.	Drainage.	Result.		Remarks.
		Immediate.	Present.	
Left in, and not ligatured	Glass tube	Recovered	Remains well	—
Fastened outside	None	„	„	I have since removed a large parotid tumour, and she made a very rapid recovery.
„	Glass tube in front, rubber one behind	Died 2nd day, exhaustion	—	—
„	Glass tube	Died in 24 hours, exhaustion	—	Never rallied, though it was not a particularly severe operation.
Dropped, and ligature brought out through loin	Glass tube in front, rubber one in loin	Recovered	Remains well	Ligature still on, but no discharge round it.
Fastened outside	Two glass tubes	„	„	—
„	Glass tube	„	„	—
„	„	„	„	—

(For report of the discussion on this paper, see 'Proceedings of the Royal Medical and Chirurgical Society,' Third Series, vol. i, p. 110.)

DESCRIPTION OF PLATE VI.

Twenty-five Cases of Nephrectomy by Abdominal Section (J. KNOWSLEY THORNTON, M.B., C.M.).

FIGS. 1 and 2.—1. Pelvic opening of ureter.
2. Papilloma broken off.
3. Ureter cut across.
4. Papilloma remaining in calculus.

FIG. 3.— 1. Healthy kidney.
2. Large sarcoma of capsule.

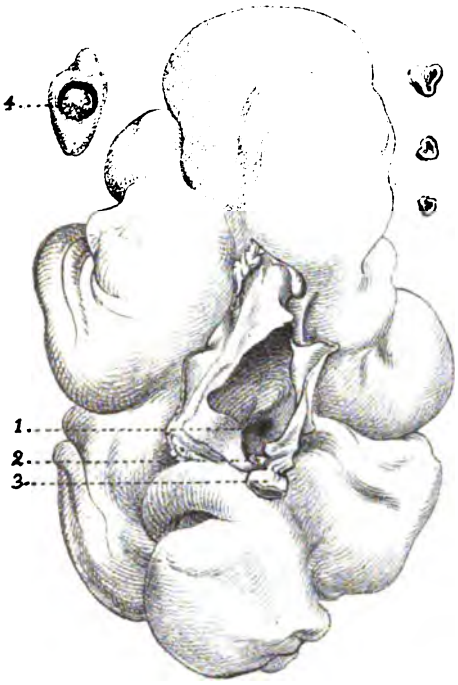


Fig 1.

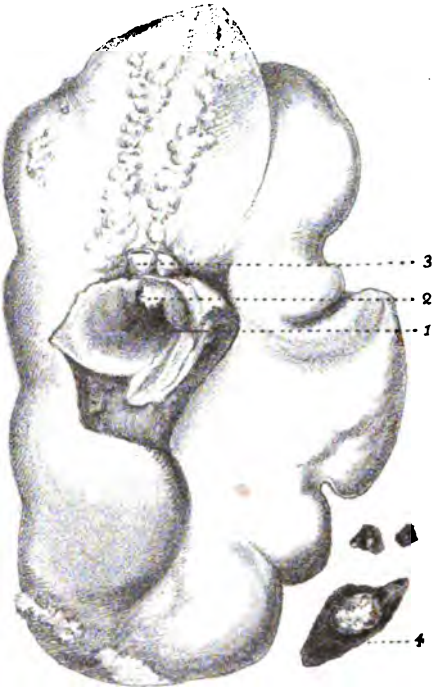


Fig 2.

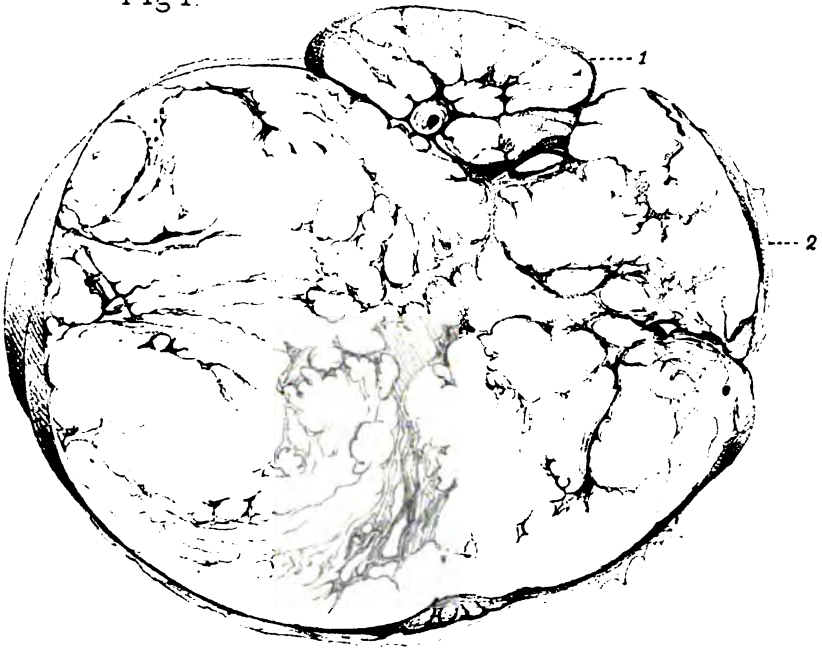


Fig 3

Danielsson & Co. lith

DERMOID CYST OF THE RIGHT SIDE OF THE CHEST

COMMUNICATING WITH A BRONCHUS.

BY

RICKMAN J. GODLEE, M.S.,

SURGEON TO UNIVERSITY COLLEGE HOSPITAL AND TO THE HOSPITAL FOR CONSUMPTION AND DISEASES OF THE CHEST, BROMPTON.

Received January 8th—Read April 23rd, 1889.

Mrs. C—, æt. 29, had not suffered from any symptoms referable to the chest during her childhood, and there was nothing in her personal or family history which could affect the diagnosis, beyond a strong rheumatic tendency in her mother. Except that she had been a little short of breath previously, the onset of her illness was sudden, and consisted in an acute pain in the right side of the chest whilst she was travelling by railway on the Continent, in May, 1879, which was rapidly followed by the development of acute right pleurisy with effusion. After a time it became clear that the pleurisy had become converted into an empyæma, and tapping was recommended by Dr. Douglas Powell in 1881. But this was for various reasons postponed, and later, some years before I saw her, the diagnosis was so far confirmed by the rupture of the empyema into a bronchus. After various fluctuations in her condition the cough and expectoration very much diminished, though

they never quite disappeared, and the patient became pretty comfortable, being able to take active exercise and to mix in society without any great inconvenience. She could regulate her cough, emptying the cavity at recognised intervals, and between them was but little troubled with it. At the same time her general health, previously much reduced, decidedly improved, and though signs of some impairment of the constitution were evident in a slight but obvious clubbing of the fingers, and the appearance of a trace of albumen in the urine, she seemed fairly robust when she first consulted me in June, 1887.

I was asked to see her by Dr. Lauder Brunton, whom she had often seen before, and whose advice she now sought because of a slight swelling in the right axilla, the centre of which was a little tender, and which was supposed to be increasing in size. A certain amount of pain was also often felt shooting up to the right infraclavicular region. There was dulness at the base, the outline of which was somewhat peculiar; it was most marked in the axilla, but extended towards the middle line in front, and in this situation reached the level of the third rib, but behind it was abruptly limited by a line passing in a curved direction downwards and inwards, and then vertically downwards below the angle of the scapula. Inside the dull area behind there was good resonance and good breathing, and above the level of dulness in front there was fair breathing but some crepitation. Over the dull area little or nothing was to be heard.

On June 15th (Drs. Brunton and Powell being present and the patient being anæsthetized) numerous punctures were made into the dull area with an exploring trochar, and at last pus was hit at the spot indicated as tender by the patient, not quite at the centre of the prominence, just outside the mamma in about the sixth interspace. The cannula was retained as a guide, as the pus lay at a depth of three inches, and after removing a portion of rib and incising the very dense pleura, a small cavity was reached, from which, perhaps, an ounce of matter escaped.

A curious sensation was then felt by the finger, for a firm rounded mass was observed at the back of the pleura, which, as we did not know what it was, we concluded to be a piece of the lung adherent to the thoracic walls. It seemed easy also to enlarge the cavity to any extent with the finger, though no more pus escaped.

The progress of events showed that the source of the expectoration had been reached, for this at once stopped. The temperature after the first three days remained absolutely normal, and we hoped that the case was about to behave like a typical aseptic empyema, although it was disheartening to note that the discharge remained copious and consisted of a small amount of thick purulent material and a large quantity of thin serum.

After awhile the tube appeared to be too short to work effectually, and the expectoration began again. The tube was lengthened, and for a time worked well, but the difficulty of maintaining effectual drainage increased, and it became evident that, if we were to succeed, something more must be done.

The patient now told me that she had coughed up two hairs since the operation, and her brother (a medical man) who had been carrying out the dressing, had noticed one or two on the tube. They were so much like the hairs of the axilla that he had thought it possible that they might have found their way from this source into the chest, and had accordingly shaved these hairs away. She also said that, long previously, she had on two occasions coughed up a hair, which she concluded must have come from a shawl or some article of clothing and been inspired. This of course suggested the true nature of the case, though, as I was unaware of any recorded examples of intrathoracic dermoids, I hardly thought seriously of the matter. She said herself that she had hinted to her husband the possibility of hairs growing inside one, but that the idea had been greeted with derision and abandoned.

On August 9th, 1887, the patient was again anæsthetized, and I enlarged the opening and felt the curious,

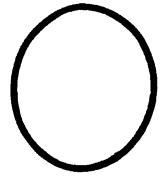
firm, rounded mass as before. The cavity again was very indefinite and perplexing, and we began to fear that no great light would be thrown upon the case by this second investigation. At last, however, I noticed a hair in the wound, and on introducing a small piece of sponge with a pair of dressing forceps and twisting it round, I extracted quite a number of them adherent to it. I then found that the mass we had taken for a lobe of the lung was simply a tightly felted accumulation of hairs and fatty material, and also that other large quantities occupied the rest of the perplexingly indefinite cavity. As much hair and fatty stuff were extracted as would fill the palms of the two hands, and then strange, white, finger-like processes were observed, one of which was drawn out into the wound; they afterwards proved to be thick masses of fibro-cellular tissue covered with white skin, from which hairs were growing. It did not seem right to go further without stating the case fully to the patient, so at this stage a very large and stiff tube was introduced, and the operation was stopped. Afterwards the discharge assumed a distinctly, though slightly, offensive smell, and the cavity was accordingly washed out daily with a solution of neutral acetate of alumina. The patient then went into the country to recruit, after having given her consent to an attempt being made to remove the cyst if it should turn out to be within the reach of surgery.

Accordingly, on September 20th, 1887, I took out more of the two ribs, parts of which had been previously removed, making about three inches altogether, and also about three inches of the rib above, so that a good view and room for manipulation might be obtained. In order to do this a free triradiate incision had to be made, and, as often happens when chronic inflammation has been present inside the chest, the bleeding from the external parts was very free and difficult to arrest. The thick pleura was then divided, and ultimately a considerable portion of it was removed. I then grasped the largest of the finger-like processes and cut it off close to its base by means of

Paquelin's cautery. Two similar but smaller masses were then removed with scissors after transfixing their pedicles and tying them tightly with silk. The cavity was thus quite freely opened up, and it was found to extend right up to the apex of the thorax, and that the skin-lined wall of the cyst was most intimately connected with the surfaces of the lung and diaphragm. It was concluded that it would be useless and highly dangerous to attempt its removal, and therefore, after all other parts from which hairs were seen to be growing had been freely treated with the actual cautery, the flaps of skin were turned in and, as far as possible, attached by sutures to the skin lining the cyst, after which the cavity was loosely plugged with strips of boracic lint.

When she had recovered from the effects of the anæsthetic, which each time made her exceedingly unwell for a few days, the improvement was rapid, and she was soon able to get about again. The discharge was still copious and rather sour smelling, so that at first irrigation with the acetate of alumina and afterwards insufflation of a powder consisting of bismuth, boracic acid, quinine, and iodoform was resorted to. The plugging of the wound was continued in order to encourage the formation of a permanent skin-lined communication between the cyst and the exterior. It was intended that this opening should be a very large one, but contraction took place to such an extent that at last it was apparently possible only to insert a small drainage-tube. It was, however, fortunately found by the medical man under whose care she came to be when abroad during last winter, that by the judicious employment of a series of tubes gradually increasing in size, and by stretching the wound at each changing of the dressing with dressing-forceps, the opening could be enlarged again till it was capable easily of admitting the index finger or even the thumb. When this point was reached and the skin had fairly lined the whole of the passage, the patient became moderately comfortable, but before that time she was troubled with expectoration, varying in

Shows the position of the opening and the scars of the operation below it.



Size of the drainage-tube now worn.

amount, and coming no doubt partly from the cyst and partly from the bronchial tube, for it seems clear that she had at least one intercurrent attack of bronchitis. Still her condition never became, and indeed it is not now, a very enviable one; for, though the expectoration and cough have stopped, the discharge from the side is very considerable, and it is very difficult, if not impossible, to keep it always free from a sourish smell, in spite of a great variety of antiseptic solutions and desiccative powders which have been from time to time employed. The dressing has to be changed at least once a day, sometimes oftener, and nevertheless the clothes became sometimes soiled. The changing of the dressing is not an absolutely simple process, and the irrigation is hardly to be managed by the patient herself, so that she feels herself debarred from paying visits to her friends, and grudges the amount of time she has to bestow upon her toilet. In addition to this, strange whistling sounds are at odd times made in the tube; as she quaintly expresses it, it is as though she were incorporated with a distinct individuality, which when anything very amusing is to the fore, insists upon chiming in with the laughter. One difficulty from which she suffered during the last winter has been overcome by means of another operation in the spring of 1888: the stump of one of the fleshy bodies protruded into the opening, and so interfered with the easy introduction of the tube and with the escape of the discharge through it. This I accordingly removed, and in doing so was able to render the lower part of the cavity more even, and to do away with some of the nooks and corners in which the sticky part of the discharge could accumulate and decompose. This operation was not at all easy, and, as on the previous occasion, gave rise to a good deal of hæmorrhage from the thoracic wall: one large artery at the upper part, presumably an intercostal, giving special trouble. Whilst it was being performed I again made a thorough exploration of the cavity, which now, as before, extends right up to the apex of the pleura, and ascertained that

there are still a considerable number of stumps of the fleshy processes left upon the inner wall. How near this inner wall may be to the pericardium I am quite unable to say, and therefore, even if it had been easy—which it was not—I should not have attempted their removal.

Obviously therefore the cyst is not likely to diminish in size and shrivel up after the manner of certain abdominal dermoids. Clearly also the discharge is not lessening much in amount, and it is also plain that the communication with the bronchus is very free, for if during the irrigation the tube be passed very far up, a fit of coughing may occasionally be produced of an alarmingly suffocating character, and accompanied by a very severe pain about the back of the sternum and the epigastrium. I suppose that the discharge, which is mostly watery but mixed with flakes of fatty material, comes partly from the skin surface but chiefly from some part of the pleura, which no doubt forms a portion of the wall of the sac, for example, no doubt the outer wall. It is almost certain also that it is in part a secretion from the bronchi, for an attack of bronchitis increases the discharge from the wound. On the whole, therefore, it can hardly be doubted that the patient's state, if in some respects less comfortable than before the side was incised, is decidedly a safer one; at all events in one respect, for the constant daily expectoration of the secretion of the cavity must have been a source of danger, not only to the right but also to the left lung, and, indeed, there was, when I first saw her, a certain amount of clubbing of the fingers and a slight degree of albuminuria. On the other hand, for some unexplained cause, the secretion is on the whole greater than it was, and, curiously enough, the clubbing of the fingers notably and rapidly increased after the last operation. Latterly the clubbing has again very much diminished.

I should add that she now wears a very large tube made of vulcanite or celluloid (see Woodcut), of oval bore, and just long enough fairly to enter the cavity.

It is curious to observe, on looking into the opening, not

only the forcible cardiac pulsations transmitted to the mediastinum, but also the protrusion of the inner wall of the cyst during coughing and expectoration. This is especially interesting in connection with the numerous observations of older writers on what has been described as *the expansion of the lung* when the chest has been opened in a living animal. This phenomenon I have had occasion to comment upon elsewhere ('Practitioner,' 1889, vol. xlii, No. 2, pp. 86 to 93), and have stated my belief that it depends almost entirely upon expansion of the opposite lung, partly perhaps upon the fact that when the glottis is closed, and forcible expiratory efforts are made, a certain amount of air may be driven from the sound lung into the tubes of that which has been rendered more or less *hors de combat* by the opening into its pleura. I do not mean to say that in a case such as this the lung upon the injured side is doing nothing at all, for as it is in parts adherent to the chest walls the inspiratory efforts no doubt cause it to expand to a certain extent; but I do maintain that if the pleura be freely opened and there be no pleural adhesions, the lung is absolutely undilatable by any inspiratory effort of the patient or animal.[1]

In Alber's 'Atlas of Pathological Anatomy,' Bonn, 1833, 46, Theilung iii, Tab. xxxiv, figs. 1 and 2, are beautiful illustrations of a very similar case. An account of the same and numerous references to the literature of dermoid cysts will be found in the letterpress, 'Erläuterung zu dem Atlasse der pathologischen Anatomie für Praktische Aerzte,' Abth. iii, S. 342, § 101. The patient was a woman aged twenty-eight, who had as a child been delicate, but was well developed. From her earliest childhood she had been liable to catarrhal affections, and

[1] The hole through which air can be expired has lately been noticed near the costal part of the opening containing the tube, and I have unsuccessfully (August 12th, 1889) endeavoured to close this by rawing the edges and the application of sutures. There has lately been some slight and unexplained elevation of temperature which appears to be subsiding. There is now no albuminuria.

when she was fifteen or sixteen she first noticed that she often brought up hairs on forcible coughing. After her twentieth year her cough, which had principally troubled her during the winter time, degenerated into a phthisis, for which she at various times was under treatment in the Julius-Spital at Würzburg, and to which she at last succumbed in March, 1839. During all this time she expectorated a large quantity of foul-smelling, puriform mucus, containing sometimes single hairs, sometimes conglomerated masses of them. At the end of her life she had general œdema, colliquative diarrhœa, and hectic fever.

At the section advanced tubercular changes were found in the right lung.

The *left*, besides similar tubercular degenerations, presented in its interior a large cavity containing hairs and the other contents of a dermoid cyst.

Appended are references to the other accounts of more or less similar cases which Dr. Lauder Brunton and I have been able to meet with in literature, but that of Albers tallies most closely with mine.

LEBERT.—Mém. sur les Kystes dermoides et sur l'heterotopie plastique. Gaz. Méd., Nos. 46, 51, 52.

CORDES.—Dermoid Cyste im Mediast. Virchow's Archiv, xvi, p. 290, 1859. He observed a dermoid cyst as large as a fist situated in the anterior mediastinum, from the walls of which grew fibrous tubercles, which were covered with cutiform membrane, and which contained hair and fatty follicles; the cyst was filled with fatty masses, had perforated at a small spot into the pericardium, which was enlarged and contained serous matter, besides masses of the contents of the cyst.

CLOETTA.—Ueber d. Vorkommen einer Dermoid Cyste in d. Lunge. Virch. Archiv, xx, 102.

CALLENBERG.—Zur Entwickelung der Dermoid Cystome. Inaug. Diss. Breslau, 1869.

NOBILING.—Dermoid Cyste der Lunge. Nach Buhl's Vortrag. Bayer. ärtzl. Intbl., No. 1. The patient had coughed up hairs during life.

PÖHN.—Beschreibung eines Falles v. Dermoid Cyste des Mediastinum Anticum. Inaug. Diss. Berlin, 1871.

FISCHER and WALDEYER.—Klinische u. anatomische Beitrage zur Geschwulstlehre. Archiv v. klin. Chir., xii, 3, 1871. Dermoid cyst of the front of the mediastinum. The tumour developed higher in the neck, in the classical region for dermoid cysts. This case throws light on the occurrence of dermoid cysts of the thorax.

MARCHAND.—Beitrage zur Kentniss d. Dermoid Geschwulste. Ber. d. Oberh. Ges. für Natur. u. Heilkunde, xxii, 1884.

GORDON.—Case of Tumour in the Anterior Mediastinum containing Bones and Teeth. Med.-Chir. Trans., 1825, xiii, 12, 16.

THOMAS.—The Treatment of Pulmonary Cysts by the Establishment of Large Openings into the Sac and subsequent free Drainage. Brit. Med. Journ., 1885, ii, 692.

SMYTHE.—Dermoid Cyst of the Lung. Amer. Pract. Louisville, 1879, xix, 313, 316.

MARRONI.—Sur une Observation de Tumeur du Mediastin. Marseille Méd., 1880, xvii, 526, 532.

BERTRAND.—Contribution à l'étude des Tumeurs solides du Mediastin et de leurs Complications. Paris, 1884, Davy.

WILSON.—On the Diagnosis of Tumours of the Anterior Mediastinum. Journ. Amer. Med. Ass., Chicago, 1884, iii, 113, 116.

(For report of the discussion on this paper, see 'Proceedings of the Royal Medical and Chirurgical Society,' Third Series, vol. i, p. 113.)

DESCRIPTION OF PLATE VII.

Dermoid Cyst of the right side of the Chest communicating with a Bronchus (RICKMAN J. GODLEE, M.S.).

The drawings represent three of the fleshy bodies removed from the cyst. The letters *a*, *b*, and *c* are placed opposite the cut surfaces, and indicate the points of attachment to the cyst wall.

a

b

c

A CASE

IN WHICH

ACUTE SPASMODIC PAIN IN THE LEFT LOWER EXTREMITY

WAS

COMPLETELY RELIEVED BY SUB-DURAL DIVISION OF THE POSTERIOR ROOTS OF CERTAIN SPINAL NERVES, ALL OTHER TREATMENT HAVING PROVED USELESS.

DEATH FROM SUDDEN COLLAPSE AND CEREBRAL HÆMORRHAGE ON THE TWELFTH DAY AFTER THE OPERATION, AT THE COMMENCEMENT OF APPARENT CONVALESCENCE.

BY

WILLIAM H. BENNETT, F.R.C.S.,
SURGEON TO ST. GEORGE'S HOSPITAL.

Received February 12th—Read April 23rd, 1889.

THE following case is thought worthy of record, partly on account of its interest in relation to the present position of the Surgery of the Nervous System, and especially as it is believed to be the first instance published in which the treatment described has been deliberately proposed and subsequently carried out.

History of the patient.—W. T—, æt. 45, a labourer, was admitted into St. George's Hospital under my care on August 29th, 1888, complaining of acute spasmodic pain in the left leg. Twenty-one years previously he had contracted chancres, which were followed by secondary symptoms and extensive ulcerations on various parts of

the body. For nine years the left leg had been swollen and painful the pain having, during the past two years become more acute and persistent; whilst at times there had occurred violent spasms in the limb, during which his sufferings were described as agonising. In 1883 he had been in St. George's Hospital, under the care of Mr. Warrington Haward, with general thickening of the left tibia, for which he was treated with large doses of iodide of potassium, slight and transitory relief only being obtained. Since that time he had attended at several London hospitals, and had taken, he said, enormous quantities of iodide of potassium and mercury without feeling in any way the better for the medicine; on the contrary, the pain steadily increased in severity.

During the year prior to his coming under my care the man's sufferings were stated by his relations to have been terrible, so much so that they were compelled to move from lodging to lodging on account of the disturbance caused by his cries during the attacks of spasm. He was said to be of steady and sober habits, and there was no history of insanity or mental peculiarity in any of his family.

On admission, the patient was emaciated, pale, and anxious looking. He complained of acute pain in the left lower limb below the knee. This pain was persistent, but occasionally was greatly increased by spasms in the limb, during which he groaned, his face at the same time being expressive of extreme suffering. The anterior surface of the tibia was thickened and irregular, but the tenderness was less than seemed probable, and the increase of temperature locally was insignificant. Scattered over the body and limbs generally were many scars of old syphilitic origin. No visceral disease could be detected, and the urine was normal.

He was given large doses of iodide of potassium, but on September 4th the pain was so acute that I thought it wise to cut down upon the thickened bone, which I accordingly did, laying open the peritoneum, which in parts was

a quarter of an inch in thickness, and subsequently trephining the somewhat sclerosed tibia above and below, afterwards connecting the trephine holes by an incision through the bone, which freely laid open the medullary cavity.

No benefit of any kind followed upon this treatment.

Gradually the spasms in the limb became more frequent and severe, especially at night, when they often awoke the patient in spite of large doses of narcotics, causing him to shriek loudly. At first these attacks could be rapidly controlled by antipyrin, of which he took large quantities, but a tolerance of the drug was soon established, and it became useless.

On September 29th, after consultation, it was decided to amputate through the knee-joint, a proceeding in which the man placed much faith. At the same time it was fully recognised that the pain was very probably due to some central lesion, and that the amputation might entirely fail to afford relief.

30th.—The leg was removed by Stephen Smith's method at the knee-joint, the operation being followed by no improvement.

On October 21st, as the patient attached some importance to a change into the country, he was sent to the Convalescent Hospital at Wimbledon, under the care of my colleague, Mr. Dent.

The spasms still continued to increase in frequency, and on November 10th Mr. Dent, with my concurrence, exposed and stretched the left sciatic nerve, removing also a small piece of the skin from the stump, over the spot from which the pain appeared to start. No benefit having been obtained from this treatment, Mr. Dent, on November 22nd, excised about two and a half inches of the sciatic nerve; but this again entirely failed to produce any effect upon the man's sufferings, which were now beginning to produce serious exhaustion.

On December 8th he returned to St. George's again to be under my care, when his condition was as follows:

—The face was thin and hollow, and the expression was one of great distress; the body was extremely emaciated, the pulse weak and at times intermittent, the temperature was normal, and the urine free from albumen but full of phosphates. Referred to the whole of the leg, which had been removed by amputation, was continual pain, and at intervals varying in length from ten minutes to half an hour, there occurred in the stump and whole of the left thigh violent spasms, which caused the patient to clutch the part tightly and shriek with pain. These attacks lasted usually for five minutes or rather more, and then gradually subsided, leaving the man exhausted and bathed in profuse clammy sweats. The spasms were limited to the muscles of the left thigh, the left latissimus dorsi, and erector spinæ.

The affected thigh was wasted, the sensation was normal, and there was no loss of power beyond that which would naturally follow such extensive interference as the sciatic nerve had been subjected to by operation. Narcotics and anodynes, whether given by the mouth, rectum, or under the skin, had little effect, unless pushed to a dangerous extent; and even when so given the spasms occurred, causing the patient to groan and contract his facial muscles as if in pain.

By December 11th it appeared to me quite plain that the exhaustion was steadily increasing, from the combined effects of pain, want of sleep, and inability to take food; and must indeed, at no very distant period, end in death, unless something could be done to relieve the man's sufferings. I therefore thought that it would be justifiable to suggest any surgical proceeding, however severe, which was likely by any means to attain this end. Taking into consideration the character of the pain, as well as a certain weakness in the lower part of the spine, of which the patient sometimes complained, it seemed not impossible that there might exist some condition of the cord or its membranes, perhaps of syphilitic origin, within the area of the lumbar enlargement which might

prove amenable to surgical interference, and further, that it would be almost certainly possible, in the absence of any such lesion, to relieve the pain in the manner to be presently described. I submitted the question therefore to my colleagues, who thought that before undertaking such a serious form of treatment a further trial of full doses of mercury should be made.

This was accordingly done, but by December 24th it was manifest that the patient was rapidly approaching the final stage of exhaustion. No good effect of any kind having resulted from the extended trial of mercury, I then made the following proposition:—First, to lay open the spinal canal and examine the membranes, or, if necessary, the cord itself, as high as the eighth dorsal vertebra, and, in the event of this exploration producing a negative result only, as seemed extremely probable, to proceed to the division of the posterior roots of those spinal nerves which seemed to correspond in their distribution to the area over which the pain was felt, leaving at least the fourth and fifth sacral nerves intact, in the hope that the control of the bladder and rectum may not be interfered with. By this operation it appeared to me that whatever may have been the cause of the symptoms I should, even if the spasms continued, at least render them painless. I also proposed to commence the exploration at the extreme lower end of the cord, in order that I might be enabled to at once divide the nerves mentioned, if, as was very likely, the condition of the patient's powers should at any moment render a rapid completion of the operation necessary, before I had been able to extend my examination as high as I hoped to do. The whole of this proposition was made with a full consciousness of the serious character of the treatment, as well as of the uncertainties which must necessarily be connected with a proceeding which, so far as I could ascertain, had not previously been adopted in the human subject.

Having received the consent of my colleagues, I carried out my intention at 1 p.m. on the same day.

The operation.—The patient having been anæsthetised, and placed on his left side with the thighs flexed, the vertebral canal was laid open in the manner indicated by Mr. Victor Horsley in the last volume of the Society's 'Transactions.' A vertical incision six inches long was made in the middle line of the back, having for its centre the spinous process of the eleventh dorsal vertebra. The muscular mass in each vertebral groove was then quickly separated from the sides of the spinous processes and posterior aspects of the laminæ by cutting freely with the knife. One vessel only was ligatured, and but three required to be clipped. The bleeding was insignificant, and rapidly ceased spontaneously. The spines of the first lumbar and of the eleventh and twelfth dorsal vertebræ were then removed with cutting forceps, and the posterior arch of the twelfth dorsal vertebra was taken away by means of a trephine one inch in diameter; the posterior arches of the eleventh dorsal and first lumbar vertebræ being then cut away with angular forceps. The extra-dural fat, for the most part, came away with the arches, and that which remained on the dura mater was easily pushed aside, giving no trouble of any kind. At the bottom of the wound, the sides of which could be widely retracted without any transverse incision, the dura mater was now freely exposed, and bulged backwards, not as a uniform tube, but at the lower part presented a circumscribed oval swelling corresponding to the area of the twelfth dorsal vertebra. There was no pulsation visible, but this could easily be felt by the finger upon gentle pressure being made. This irregular shape of the dura mater was so suggestive of the existence of some lesion beneath that it was decided to open it at once. A small puncture was therefore made, from which the clear cerebro-spinal fluid immediately jetted forth to a height of about six inches. This fluid having been allowed to slowly drain away, the dura mater was laid open along the whole length of the wound. The cord exposed was now seen to be perfectly natural in every respect.

The posterior arches of the ninth and tenth dorsal vertebræ were then removed by the cutting forceps, and the cord further exposed by extension of the incision in the dura mater to the upper limit of the wound, nothing abnormal being detected, in spite of a very complete examination of the cord on all sides, by gently raising it on a blunt hook.

At this stage Mr. Haward, who was kindly watching the pulse, informed me that the patient's strength would probably stand no further exploration. I therefore, as quickly as possible, picked up, one by one, the left lumbar posterior nerve-roots, which were readily distinguished by their size and relation to the ligamentum denticulatum, and divided, as I supposed, the lower four of these with a pair of strabismus scissors. This proceeding resulted in the complete arrest of the pulse, which, however, almost immediately returned upon a little gentle pressure being made on the cord with a warm sponge. I then picked up what I supposed to be the two upper sacral nerves, and also divided their posterior roots, with the effect of again suddenly stopping the pulse which rapidly reappeared as before.

The patient had now become so exhausted that I dare not expend time in stitching up the wound in the dura mater, as I had intended to do, its edges were, therefore, merely adjusted as accurately as possible.

The wound in the soft parts was now closed by means of seven silk sutures, four deep, and three superficial. One drainage-tube having been placed at its lower end in contact with the dura mater, and a second at the upper extremity in the superficial parts. A moist sublimate dressing was then carefully applied, and the patient put to bed, the actual operation having lasted a little over one hour and a quarter.

In consequence of the haste with which the division of the nerve-roots had to be completed, there was some doubt as to whether I had not omitted to cut the second lumbar. This ultimately proved to be the case, but the immediate

success of the treatment was fortunately not affected by the omission.

The most striking points noticed during the operation were the following:

1. The extreme comparative ease with which the spinal cord can be exposed even in its most inaccessible situation, as in this case, where it lay at its greatest depth from the surface.

2. The singular insignificance of the hæmorrhage, which was certainly less in quantity than is ordinarily lost during the removal of a mamma. The satisfactory result is undoubtedly due to the rapidity with which the muscular arterial branches retract and close after their division with a sharp knife.

3. The irregular shape of the dura mater, and the want of pulsation in it.

4. The absence of any sudden effect upon the pulse, either by the general severity of the proceedings, the escape of cerebro-spinal fluid, the free incision of the dura mater, or even the lifting of the cord from its bed for purposes of examination.

5. The sudden cessation of the pulse upon the division of the nerve-roots, and its rapid re-appearance when slight pressure and warmth were applied to the exposed cord.

Subsequent progress of the case.—An hour after the operation the patient was sleeping, bathed in perspiration; but the pulse, although weak, was at least as strong as when he was first placed on the operating table.

At 9 p.m. on the same day the man was irritable and grumbling because his back felt so weak; he also complained of pain shooting down both thighs. The temperature was 100·6°, the pulse 104. He had taken nourishment.

A restless night followed, during which a good deal of discomfort was felt about the back. The spasms in the thigh occurred at intervals, and were distressing, because they shook the patient, rather than from any actual pain connected directly with them. Urine was

voided naturally, although as a precaution it had been drawn off after the operation.

The next morning (December 25th) found the man still very irritable and discontented. There was considerable sweating. The pulse was rather stronger, the temperature 101°. Nourishment was taken freely.

The pain shooting down both thighs continued, but soon disappeared after the removal of the lower drainage-tube, which probably pressed a little on the theca as the patient lay on his back. The night following was better, with no pain worth mentioning.

On the 26th December the cerebro-spinal fluid, &c., had completely soaked the dressings again. The wound was therefore dressed. It was looking perfectly quiet, and was commencing to heal at the upper part, in spite of the violent twitches which frequently occurred in the mass of muscles forming its left side.

The temperature was 100·6,° the pulse distinctly fuller, perspiration less.

The bowels acted once naturally during the day. The urine was passed in the ordinary manner, and appeared normal.

27th.—The temperature was still rather high and irritable, fluctuating upon the least movement or excitement. The pulse was also very irritable, but, on the whole, not very weak. Nourishment was taken freely still, but towards night he was stated to have been slightly delirious once or twice. The next day, however, he was altogether better, and well pleased with his general condition.

29th.—The patient was comfortable, quite free from pain, and looking altogether better in the face. The spasms occurred at intervals, but were not painful; indeed, he had ceased to complain of them.

Some diarrhœa occurred during the morning, and unfortunately a portion of one of the loose motions passed up beneath the dressings, an accident, however, which was followed by no serious consequence.

The wound was dressed, and found to be almost healed, the upper tube having been removed and two of the deep stitches taken out.

The flow of cerebro-spinal fluid was still free, but rapidly diminishing. In connection with this a rather curious fact was observed, viz. that whereas the irritation caused by this fluid on the right (sound) side of the wound was intense, on the left side, which was in great part insensitive, there was hardly any irritation at all. I at first thought that this was due to the fluid trickling more particularly over the right side; but it could hardly have been so, as the patient up to this time had been lying flat on his back; moreover, the moisture in the immediate neighbourhood of the wound was uniformly distributed over the dressings. It was further noticed that a small bedsore, situated over the left sacro-iliac joint, which had been quite inactive before the operation, rapidly healed after the part had become insensitive.

The notes of the case after this date need not be given in detail. The diarrhœa, which was very obstinate, ultimately subsided, the bowels acting twice daily. A small abscess, caused presumably by the passage of the loose motion into the dressings, formed along the tract of a suture, but was superficial, and gave rise to no serious inconvenience. The temperature gradually fell. The pulse varied considerably at different times, but on the whole steadily gained strength. The spasms occurred as before, but the pain did not return.

On the morning of January 3rd, 1889, the patient was comfortable and contented. The temperature was normal, the pulse 84 and regular, the appetite was good, the bowels had acted healthily. The wound, which was now dressed with boric ointment, had entirely healed, with the exception of a small sinus at the lower end, through which there drained in the twenty-four hours sufficient cerebro-spinal fluid to cause a mark on the dressings of about the size of a crown piece.

In the evening he complained of flatulence, and vomited

some food which he had taken shortly before. A good night, however, was passed, and on the following morning (January 4th) at 10 o'clock, when I happened to be in the hospital, he was quite himself.

About 11 a m. he said he felt "queer" in his head and placed both hands under his occiput. Almost directly he became suddenly collapsed, and vomited with violent straining. Copious cold sweats followed, and the vomiting recurred. All attempts to rally him from the collapse failed, he shortly became semi-comatose, and died on January 5th, at 2.30 a.m.

In the progress of the case nothing beyond the points incidentally alluded to in the notes requires special comment, excepting *the effect of the operation upon the sensation in the affected thigh.* This was in some respects remarkable. (See Diagrams, p. 347.)

On December 26th, at 1 p.m., the earliest time at which the patient's irritability would admit of the application of any reliable tests, the condition was as follows (Diagrams A. B.) :—The whole anterior aspect of the thigh was absolutely insensitive. The upper margin of this anæsthetic tract being abruptly marked by a line commencing just above the anterior superior iliac spine, and passing sinuously downwards to the point where the thigh joined the perinæum. Laterally this line of demarcation coursed downwards and backwards from a point about two inches behind the anterior superior spine, to the junction of the middle with the lower third of the buttock, from which, on the inner side, it curved upwards, passing close to the left sacro-iliac joint to terminate just below the middle of the operation wound, the left side of which at the lower part was quite insensitive.

The external, internal, and posterior aspects of the limb were insensitive, excepting along a narrow vertical tract, about one inch wide, which commenced suddenly at the lower border of the gluteal fold and passed down on to the back of the stump, fading away almost to nothing at its lower end.

Over an area extending downwards for about eight inches along the outer side of the thigh, from a point situated three fingers' breadth below the anterior superior spine of the ilium, the anæsthesia was less absolute than in the other parts.

The whole perinæum was normal in its sensation, and the external sphincter resented with its usual "grip" the introduction of the finger into the anus.

From the conditions just described it was clear that in dividing the nerve-roots I had not interrupted to any material extent the fibres passing to the small sciatic, that I had in no way interfered with the nerves supplying the parts about the perinæum, and that the nervous supply to the rectum and bladder had been left intact. It was also manifest that the genito-crural nerve had partly escaped injury, and that the external cutaneous had been only partly interrupted; these last two circumstances tending to strengthen the doubt which was felt as to my having divided the posterior root of the second lumbar nerve.

On January 3rd, 1889, the last occasion on which the sensation of the affected parts was tested, the condition was as follows (Diagrams G. H.).

The whole circumference of the greater part of the lower half of the thigh was at least as sensitive as the corresponding part on the opposite limb. Over the upper half of the anterior surface there was an anæsthetic area, limited above by a line which, commencing one inch below the anterior superior iliac spine, passed with a double curve downwards and inwards, coursing round the inside of the thigh two and a half to three inches from its junction with the perinæum. Passing down the centre of the inner side of the thigh from the perinæum was a tongue-shaped sensitive tract, about five inches long, the base of which was three inches wide, or thereabouts. The posterior margin of this tongue passed upwards, and joined the gluteal fold at the outer end of its innermost fourth (Diagram H.).

The superior half of the posterior aspect of the thigh was normal in its central (vertical) two fourths, this area of sensitiveness passing rather abruptly on each side into the anæsthetic parts.

The lowest third of the buttock was still insensitive, but above that level all the parts which had at first been deprived of sensation were now normal. The stages of transition from the condition of December 26th, 1888, to that of January 3rd, 1889, can be seen at a glance by reference to Diagrams C, D, E, F.

It is, I think, obvious that the rapidity with which sensation was recovered by the parts previously rendered insensitive by the operation, greatly exceeded anything of the kind commonly met with in surgical practice when a complete nerve-trunk (e. g. the median) has been divided. Moreover, this restoration, as was shown by the post-mortem examination, was quite independent of any attempt at union between the divided ends of the nerve-roots. Although it is, I understand, pretty generally accepted by physiological authorities, that complete restoration of sensation may follow, with remarkable rapidity after the division of the posterior root of a spinal nerve on the proximal side of its ganglion, there has been, so far as I can ascertain, no extensive corroboration of this view in the human subject, until the occurrence of the case which I now record.

To whatever cause the return of function may be attributed, one very important contingency seems fairly certain in the case, viz. that had the patient lived sufficiently long the sensation over the whole of the affected part would have been regained, and further, that no danger of a recurrence of the pain need have been apprehended with the return of sensation, seeing that the restoration was independent of union between the cut ends of the nerve-roots.

Post-mortem examination.—The operation wound was soundly healed, excepting at its lower end, where a narrow channel led directly into the vertebral canal. On cutting

down through the line of union a small abscess cavity was found between the muscular planes, following the course of two of the suture tracks; the abscess was, however, quite superficial to and unconnected with the spinal canal.

The posterior arches of the ninth, tenth, eleventh, twelfth dorsal and first lumbar vertebræ were wanting.

The wound in the dura mater was healed over its upper two thirds, but below the edges gaped, and were fringed with granulation tissue, lying upon which, on the right side, was a thin streak of organising lymph.

The spinal cord was perfectly normal as far down as the lower border of the sixth cervical vertebra. Below this point there were some minute recent blood extravasations in the sub-arachnoid space, and in the sub-dural space, about the level of the ninth dorsal vertebra, was also a small recent clot.

Opposite the seventh and eighth dorsal vertebræ there was a well-defined hardish thickening of the arachnoid on the left side, about a quarter of an inch wide and an inch long, somewhat spindle shaped, which apparently involved two of the posterior nerve-roots.

On the left side the first, third, fourth, and fifth lumbar and first and second sacral posterior nerve-roots had been divided, the proximal ends lying close to the cord, the distal extremities just appearing at the dural foramina. There was no attempt at union between the cut ends.

No lesion was found in any of the nerves forming the lumbar and sacral plexuses.

On opening the skull there was at once noticeable a relative smallness of the occipital lobes of the brain, especially on the left side, on which the surface was much discoloured by blood extravasation. On the upper surface of the tentorium, on each side of the falx, was a large patch of effused blood, and beyond this there was found, on the left side, another considerable blood-clot firmly adhering to the dura mater.

The occipital lobes, in addition to the peculiarity already alluded to, were distinctly harder to the touch than any other part of the brain. Scattered about the pia mater

over the convexities of the two hemispheres, were a few well-marked opacities.

On section the whole brain with its vessels appeared healthy.

Microscopical examination.—Sections from the various regions of the spinal cord were prepared by Dr. Penrose, who has kindly provided the report which forms the appendix to this communication. As will be seen, the main point shown in the sections is a somewhat extensive *sclerosis* in the posterior root-zones and columns of Goll.

The sclerosed areas are more extensive in the left half of the cord than in the right, although the excess of sclerosis in the left side varies somewhat in different regions of the cord. Beyond the lesions noted in the cord itself nothing has been found which could in any way account for the pain from which the patient suffered.

As to whether the pain was in reality connected with the sclerosis I am unable to express any decided opinion, but the marked excess of the lesion in the left posterior region of the cord points to the possibility, at all events, of its having been the cause of the symptom. One point, however, seems quite clear, viz. that the perseverance in the administration of drugs could have effected no useful purpose, a circumstance which, in my mind, goes far to justify the treatment finally carried out, as I can conceive no other method by which the necessary relief to the sufferings could have been procured.

The cause of death.—On this point I am not quite clear. It is, of course, possible that the collapse which ushered in the fatal termination may have been in some way connected with the loss of cerebro-spinal fluid, but on the whole this seems unlikely when the length of time which had elapsed since the operation is considered, and also as the quantity of fluid draining away had become so small, and, indeed, was gradually growing less, there having been no sudden increase or diminution shortly before the onset of the fata symptoms.

It is obvious that there was nothing whatever about the

parts at the seat of operation to account for the symptoms, indeed, with the exception of the small abscess in relation with the track of the suture, which was of no consequence at all, the condition of the parts was quite satisfactory, the minute recent hæmorrhages being clearly due to the straining from the vomiting.

It is probable that the fatal issue may be attributed to one of two causes: (1) vomiting, possibly from flatulence with much straining, which produced the cerebral hæmorrhage and collapse; (2) apoplexy resulting in vomiting, collapse, and semi-coma.

Some slight evidence in favour of the former of these two causes is afforded by the fact that the patient was stated to have had on a previous occasion a similar attack of vomiting followed by collapse, from which he recovered slowly.

In conclusion little remains to be said. Cases in which a consideration of the treatment adopted in this case would be indicated must of necessity be rare. At the same time I can recall to mind certainly two patients who suffered from intractable pain of this kind, although hardly so severe, in each of whom repeated amputations were practised without any good result.

I venture to submit that in the case I now record the treatment was not only sound in theory, but was practically justified by the result, for the relief from pain was complete, and the patient lived not only long enough to survive the immediate effect of the operation, but also to commence what I think may, without any straining of terms, be called convalescence.

It is true that at the end of twelve days he died from a sudden and unexpected cause, but it is by no means clear that his death was even remotely connected with my operation; in fact, the inference seemed to be rather that the fatal issue was, as it were, accidental. Moreover, it was manifest to all who saw the patient before the operation, that he was certainly although slowly sinking, and that his survival for very many days was hardly possible. It was

also quite plain that the attacks of exhaustion which followed the spasms might at any time end in fatal collapse.

Even if it be conceded for the moment that the issue was remotely contingent upon my operation, it seems extremely unlikely that life was shortened, and it is certain that it was made comfortable.

Considering the remarkable way in which the man rallied, in spite of his previous state of extreme weakness, from the immediate shock of the operation, and the manner in which the strength was returning up to the time of the commencement of the fatal symptoms, I cannot help feeling that had I possessed the courage to propose and carry out the treatment earlier in the case, when the constitutional powers were comparatively good, instead of wasting valuable time by acquiescing in the patient's wish to go into the country, there is every probability that this paper, in the place of containing a description of a post-mortem examination, would have been accompanied by a living specimen.

APPENDIX.

Result of Microscopical Examination by Dr. Penrose.

No lesions other than the following have been detected in the contents of the spinal canal:

The pia mater sheath of the posterior root of the left sixth dorsal nerve is thickened by cicatricial deposit, which binds it down to the surface of the cord, forming an extra sheath completely surrounding the fibres of the nerve, of which the endoneurium and perineurium are both increased. This sheath is apparently composed entirely of fibrous tissue, of tolerably recent though not of fresh origin, as is shown by the degree to which the fibrous tissue has been formed with the very small quantity of round-cells present. This

condition may be taken as fairly clear evidence that the thickening had existed longer than twelve days (the period which had intervened between the date of the operation and the death of the patient). The nerve-fibres contained within this mass of tissue show signs of inflammation also in having lost their medullary sheaths. The axis cylinders are still for the most part, if not entirely, intact.

It is impossible, from the histological characters, to determine whether the mass is or is not gummatous in nature.

In the neighbourhood of the operation wound is a little recent granulation tissue tracking up the cord for a short distance along the pia mater.

The spinal cord.—Sections have been cut and prepared from the following regions:—Upper and middle cervical; upper, middle, and lower dorsal; upper, middle, and lower part of lumbar enlargement.

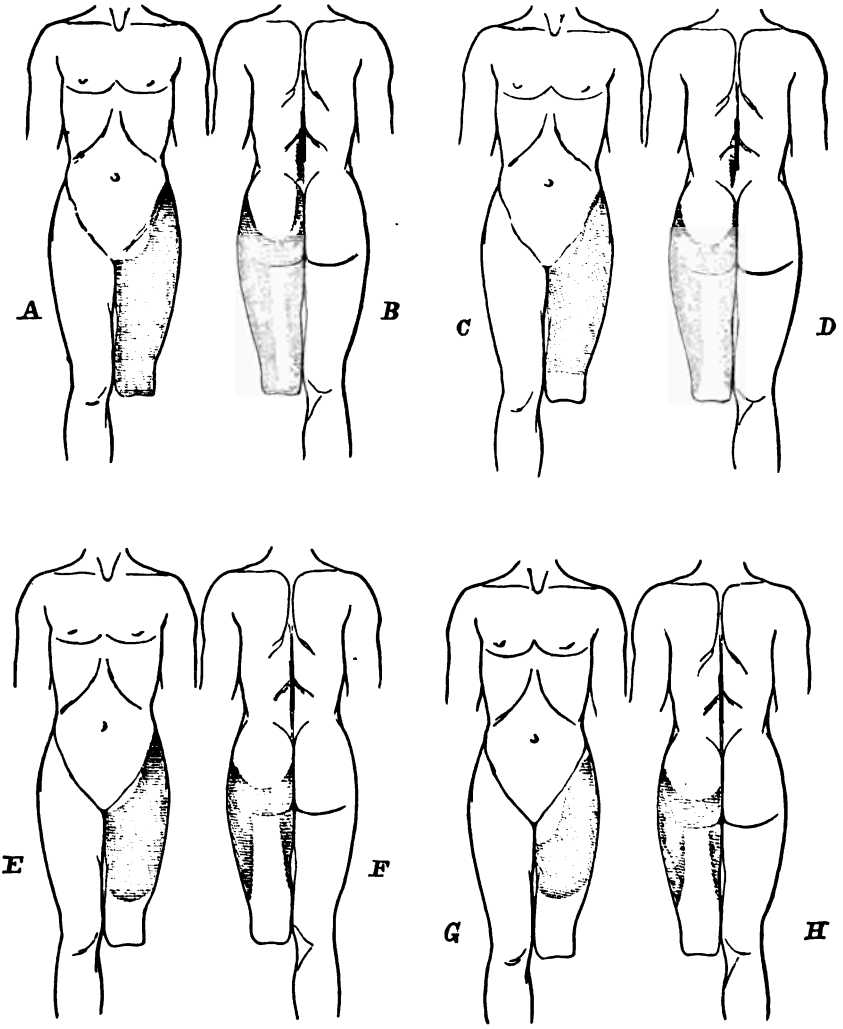
The sections have been stained by Pal's method (a modification of Weigert's); with aniline, blue-black; lithium carmine; and sections from all the regions have been stained by each of these methods.

Throughout the whole of the lower half of the dorsal portion of the cord there are small irregularly distributed areas of sclerosis in the posterior median (Goll's) columns and in the posterior root-zones.

The section shown in the drawing (Plate VIII) is from the lower dorsal region, and it shows fairly typically the condition of the whole of the lower half of the dorsal portion of the cord, although in the other parts the sclerosis is slightly different in position, and is apparently more irregular.

The sclerosed areas tend to gradually diminish towards the upper dorsal region, and finally disappear altogether, leaving the cord above the middle cervical portion quite normal in appearance.

The sclerosis throughout is distinctly more extensive in the left than in the right half of the cord, and tends to affect the posterior median columns proportionately more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in the higher parts of the cord, although, as has been mentioned, the general area of the sclerosis is less in these regions.

In the posterior root-zones there is no one part in which the lesion can be said to be relatively more extensive than in another.

There are no changes in the vessels of the cord suggestive of syphilis.

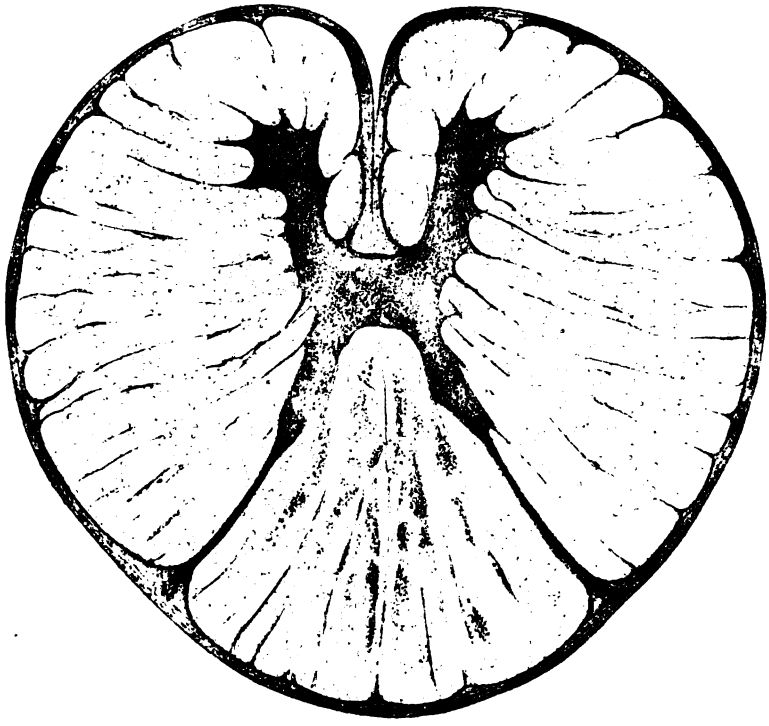
The sections of the brain which have been examined show nothing abnormal.

(For report of the discussion on this paper, see 'Proceedings of the Royal Medical and Chirurgical Society,' Third Series, vol. i, p. 115.)

DESCRIPTION OF PLATE VIII.

A Case in which Acute Spasmodic Pain in the Left Lower Extremity was completely relieved by Subdural Division of the Posterior Roots of certain Spinal Nerves; all other treatment having proved useless (WILLIAM H. BENNETT).

Transverse section through spinal cord in lower dorsal region, showing distribution of sclerosis in posterior area.



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PLASTIC OPERATIONS

ON THE

NECK AND ARMS FOR SEVERE CICATRICIAL DEFORMITIES AFTER BURNS.

BY

JOHN CROFT.

Received March 7th—Read May 14th, 1889.

I HAVE limited the scope of my paper to plastic operations on the neck and arms, and to operations for the relief of severe deformities from the effects of burns, because I hope to limit discussion to a particular mode of transplanting skin flaps in such cases. The treatment adopted in the five cases about to be narrated is not unlikely to raise discussion on the whole subject of the surgical treatment, operative and instrumental, of such deformities as those referred to in the title of the paper, but I should be well pleased if this preliminary observation has the effect of limiting any discussion which may arise to the exclusive use of plastic surgery for the relief of *extensive* contractions and deformities after burns. I do not pretend in this short communication to review the respective advantages of non-instrumental and instrumental treatment. I have not had any experience in the employment of instrumental or ortho-

pædic apparatus for such severe deformities as those my patients were suffering from, and therefore I do not offer any observations on the subject. My particular object is to advocate the use of large flaps transplanted in two stages or by two separate operations.

The history of this mode of procedure appears to be one of gradual advance from small beginnings. Sir William Mac Cormac in his address on plastic surgery to the Midland Medical Society in 1888 referred to this plan of raising bridge-like flaps to be transplanted in two stages, but gave no historical account of it, and I believe that I am right in saying that he had not, and that he has not succeeded in tracing it to any historical origin.

For my own part I first made acquaintance with it in 1880, when I took under my care in St. Thomas's Hospital a boy who was the subject of severe "talipes calcaneus" caused by the contraction of a burn-scar on the front of the leg, ankle, and foot. When thinking of the best way to relieve this condition, I was reminded by Sir William, then Mr. Mac Cormac, of the successful use of bridge-like flaps in closing up "ectopia vesicæ." I determined to adapt the plan to the case before me. I failed to find any reference to this mode of transplanting in any works of reference, and in proportioning my flaps I felt compelled to proceed experimentally. I decided to begin by making the flap not more than three times longer than the width of its attachment. Casts and drawings of this case were shown.

The case turned out very successfully, and I published an account of it in the 'Med. Times and Gaz.' for November 17th, 1883, after the operation had stood the test of quite two years' wear and tear. In my remarks on the case at that time I gave the opinion that "the length of the straps should not be much, if any, more than three times the width."

Nearly two years elapsed before I again had an opportunity of putting this plan of transplanting into practice.

At the beginning of 1882 a young woman was put under my care for the relief of a severe contraction of the side of

the neck caused by a burn in childhood. I determined in this case to proceed on the same lines as before, and in this Sir William Mac Cormac concurred with me. In this case and four subsequent ones I raised flaps eight to nine inches long by two and a half inches to three inches wide. This is what I mean by raising flaps on a large scale. Later in the same year (1882) Sir William Mac Cormac treated a case in St. Thomas's in a similar manner, but did not use such large flaps.

I may say here that I have consulted all the recent systematic works on surgery, and failed to find anything more than a brief reference to this mode of transplanting skin, and I have not discovered any instructions on the subject beyond those included in Sir William Mac Cormac's paper already referred to.

I believe that it will be now a convenient mode of presenting the subject if I give a general account of the mode of operating in the five cases on which this paper is founded, then to give a brief narrative of each case, and, lastly, the conclusions and criticisms which I have ventured to draw up.

Mode of operating.—The strap or bridge of skin to be raised was in my cases cut where it could be taken free of scar tissue and well supplied with blood, yet sufficiently near for twisting into its bed. For the neck, the skin to be transplanted was taken from the back of the neck and shoulder, and measured eight and a half to nine inches in length, or sufficiently long to cross the median line of the neck.

In the arm similar measures were taken, and the bridge raised in a similar manner. These bridges were cut as thick as possible, especially in their central parts. The bleeding from the flap and wound was carefully arrested before dressings were applied.

The sides of the wound were approximated by sutures, but tension from them was avoided as much as possible. With the object of promoting approximation or preventing retraction of the edges, these were also sutured to the muscle and fascia near the centre of the gaping wound.

This fixation of the edges was of assistance in limiting the extent of surface which was to heal by granulation.

The strap or bridge was left attached at each end.

The under surface and edges of the bridge are to become covered by granulations, and the whole to become charged with plastic material, and to remain abundantly vascular. This condition is to be promoted, and measures taken to ensure it.

The bridge must be prevented from re-uniting, and great care has to be taken that granulations do not spring up in the angles formed between the pedicles and the raw surface. In that situation there is not a little risk that the length of the span may become insidiously shortened.

Dressing.—I made use of oiled silk protective, dipped in carbolised oil, to insert between the raised skin and parts beneath it, carefully drawing it under the pedicles. This made an excellent dressing for this part, as it prevented any other dressings from sticking to the raw surface. The flap and wound were then covered in by antiseptic oiled dressings and salicylic wool. These were lightly but securely bandaged on, and in such manner as at the same time to keep the most movable part—as the head and neck or arm—in a fixed posture. There was some difficulty in keeping the long narrow bridge of skin from swaying and festooning.

In the fifth case, that of a rather restless child aged nine years, I experienced a great trouble from the mobility of the strap of skin. Partly owing to the movements of her head and neck, the centre of the strap showed signs of impaired nutrition. It began to ulcerate and to narrow and thin. This was stopped by applying a rigid apparatus to the trunk and head and neck, but irreparable injury had been done to the flap, and I would strongly advise anyone operating on a similar case in the young to apply an apparatus at the time of the first operation. In operating on the arm, for the first stage, in the adult, I have not needed any fixed apparatus, but I think it would be better to use it in the young.

If all goes well and no complication occurs, in a fortnight or three weeks' time it will be safe to proceed to the next stage of the operation, viz. that of cutting across the contracted scar and transplanting the strip of skin. In judging of the right moment for beginning this second stage, the condition and extent of the granulating wound must be taken into account, with the fresh loss of blood which must ensue in making a bed for the transplant, the extent of this fresh wound, and the influence that these will have upon the vitality and vascularity of the transplant, which must now depend on one pedicle instead of two. When the operator thinks that the strength of his patient is quite equal to the occasion, he may proceed, but if he is in doubt he should wait a little longer.

At this second operation it is better first to cut through the contracted scar, and afterwards to cut across one end of the bridge. In dealing with the scar I have not sacrificed any tissue. I have been particular to cut down through scar tissue until I reached healthy fat or fascia or muscle. I need not say that all bleeding should have ceased before the final fixation of the transplant.

The bed and the transplant must be made to agree in length and for the most part in width, but the shape of the fresh wound cannot always be made to correspond exactly with the shape and extent of the transplant.

The form of this bridge has now considerably changed from what it was when it was first cut. It has become shorter and narrower, somewhat like the string of a bow. It has, however, become thicker from the quantity of plastic matter with which it is loaded.

In the neck and upper arm cases, the distal end of the flap was the one to be cut across, in the lower arm the proximal end was the one to be severed. The act of severance is always attended by a certain amount of local shock which should be allowed for.

Next the strap should be to a certain extent trimmed. The edges and granulating under surface at the free end, for a distance of nearly or quite half the length of the strap,

should be pared or freshened, so that they shall present raw surfaces for primary union. In no case did the transplant correspond in its uniform width to the width of the bed for it. This always varied except at the part which was to receive the free half or third of the transplant.

It is enough to obtain primary union between the free end of the strap and the fresh wound. This union anchors the strap and fixes it in its place. Union along the rest of the extent of the transplant is only a work of time. The healing by granulation is not slow. At first the transplant looks very ungainly and unsightly and unpromising. As week after week goes by and healing takes place, the sausage-like thing flattens down and spreads out, until finally it may become twice as wide as it was originally cut.

The part of the transplant which causes anxiety is the distal inch of it. This may slough to a slight extent, and union may therefore fail to take place. In consequence of this the strap may retract from its holding. It must be then kept in place by strapping, and this is a troublesome process. Moreover, a vertical or longitudinal scar may be the result at that spot, and in the neck a vertical or longitudinal scar is to be particularly avoided. It is more necessary to avoid failure of terminal union in the neck than in the arm. A median vertical scar in the neck is a great blot on the success of the case; that scar may contract or at least it may prevent stretching there. It will stand out as a frænum. The present condition of the girl Emma W— illustrates this.

In each of the two completed cases of operation on the neck I had to resort to a third operation, in order to neutralise the consequence of having allowed a vertical scar to form in the front of the neck. I raised a flap of suitable proportions from the chest and turned it upwards into the front of the neck at one and the same operation in each case. This has improved the state of things in that situation. In the third case the deformity is still under treatment. Although I point out the evil I must confess that

in indicating the remedy I am not confident that it will always prove infallible.

I would suggest that the strap or bridge should be made of the same large proportions, but to spring from lower down the slope of the neck, and to extend lower down on to the front or back of the shoulder. This would enable the operator to bring the end of the transplant further across the front of the neck and as far as the opposite side of it.

After the granulating sores have all finally healed the surgeon must wait patiently for about six months before the full effect of the proceeding will be fit for judgment.

Results.

First case (contracted neck case).—It is now six years and five months since this case finally left the hospital. Though the drag upon the mouth and ear is still slightly perceptible, her appearance has been greatly improved. The movements of the head and neck and shoulder are fairly free. The portions of skin transplanted are far wider than when she left the hospital, and yet they are soft, elastic, and free from any vicious change. She has been able to earn her living as a dressmaker until, just recently, a temporary illness has thrown her out of employment.

Second case (contracted arm case).—She left the hospital in February, 1885, and therefore upwards of four years and three months have elapsed since she was under treatment. She is most grateful for the benefits she derived from the operations. She can extend her arm freely, and can carry heavy weights. The flaps and scars continue sound. Lastly, but of first importance, she has married.

The *third and fourth cases* (contracted neck and arm in one person). She left the hospital in October, 1887, and therefore one year and seven months have elapsed since she left. The flap transplanted into the neck is seen to form a wide, soft, elastic side to the neck. There is no dragging

on the side of the face and chin. The personal appearance has greatly improved. The arm is in an equally satisfactory condition. The subject of these operations is now training to become a nurse. Had not the condition of the neck, and particularly that of the arm, been greatly improved she would not have been accepted as a probationer. She had set her heart on becoming a nurse.

Fifth case (neck case).—The treatment of this child has not yet been finished. It was a very bad case, as the photographs show. The dragging on the features on the right side had produced very considerable deformity. This deformity had been much diminished, and we are justified in expecting still further improvements.

Conclusions.

The advantages claimed for this plan of operating are:

I. That risks of sloughing of any part (edges or free ends) are greatly diminished. The transplantation being made two or three weeks after the first operation, the local effects of shock are avoided or reduced to a minimum, viz. only that attending the severance of the pedicle.

II. That instead of being transplanted when recently drained of blood and reduced in temperature it is moved when abundantly vascular and full of active living plastic matter.

These advantages, which enable the operator to proceed with confidence and deliberation, are to be set against the longer time during which the patient remains under treatment.

When the flap is raised and the scar operated on at the same sitting the healing by primary union and by granulation goes on concurrently. When the proceedings are separated by three weeks' interval, the duration of treatment is somewhat prolonged. However, this is amply compensated for by the advantages already mentioned.

III. The practice adopted in the cases narrated has

manifest advantages over the plan of transplanting flaps from a distant part of the body. The forearm is a convenient region from which to transfer skin to the neck, but it is obviously not available for such large flaps as those required for the cases under consideration.

When seeking for smaller transplants to the neck, for instance, for such a piece of skin as that required in Case 5 (the incomplete case) we might adopt the plan of shifting a piece from the abdomen to the forearm and thence to the neck. This would be an adaptation of a plan suggested by Dr. Shrady, of New York, and mentioned in Sir William Mac Cormac's address on plastic surgery already quoted.

The patients on whom the operations had been performed were all exhibited to the Society, and photographs were also shown.

Case 1.—Rose G—, æt. 19 years, admitted October 17th, 1881. Burnt by fire when a child, badly, on right side of neck and on right arm.

On admission she presented a cicatricial contraction on the right side of the neck, extending from the level of the lower jaw to the clavicle. A band or fold was formed by the contraction; this band was an inch and a half in width, and overlapped to this extent anteriorly. The lobe of the ear was effaced, and the corner of the mouth was drawn down with part of the lower lip. The outline of the jaw was not visible, and the head on this side was dragged over towards the shoulder, the movements being restricted (see Figs. 1, 2, and 3).

January 14th, 1882.—First operation. A strap of skin was raised from the back of the neck and shoulder; it extended from the level of the seventh cervical vertebra to near the posterior fold of the axilla. It was nearly nine inches in length, and about two and a half inches in width. It was left attached at both ends. The edges of the skin wound were approximated as nearly as possible by sutures. The strap was wrapped in oiled silk protective, and the whole dressed with lint soaked in warm oil

and terebene. No rigid apparatus was put on to prevent movements of the head and neck, but the arm and head were bandaged into position.

On February 18th, or thirty-fourth day, the second stage of the operation was performed. As the patient's health had been slow to rally from the first operation, this long period had to be allowed before the second stage was undertaken.

An incision was carried completely across the side of the neck, nearer the jaw than the clavicle, and the edges of the skin were raised so as to form fringes about one inch

FIG. 1.—R. G— before any operation.

in depth. The axillary end of the strap was cut across, and the flap transplanted on to the neck. The free end and upper edge were carefully sutured into position, and about one third of the lower edge was fixed by sutures. A transverse incision was made above the right mammary region to relieve tension.

The length of the flap transplanted was not so long as it should have been, but was as long as the width of its basal attachment warranted. The free end of this flap died to

the extent of nearly an inch, and in consequence of this the whole flap began to contract and retract, and had it not been for some union along the upper edge of the flap a failure might have ensued. By strapping and bandaging, the union was increased and strengthened until the transplant had wholly united.

FIG. 2.—R. G— five years after operations. The dotted lines show the situation and extent of the strap of skin which was raised and transplanted.

A vertical scar was left to the right of the median line of the neck, and here the contraction was still considerable, partly owing to the unrelieved original deformity, and partly to the rigidity of the vertical scar.

She was sent out on the 26th May, a little over three

months after the second operation, with directions to return in a few days for another plastic operation.

She was readmitted, and a month later I undertook another operation to relieve the contraction in the front of the neck. I proposed to do this by raising a bridge of skin from the chest, and by transplanting the flap on to

FIG. 3.—E. G.—five years after operation. Shows the greatly improved appearance of patient. The dotted lines show the situation into which the first transplant settled, and the name of the second transplant.

the front of the neck. This bridge was about six inches long and two inches wide, and extended from near the top of the sternum outwards and slightly downwards towards the axilla. Its lower edge skirted the mamma. It was dressed after the mode already described.

On the fifteenth day after this step I made the second. An incision was made across the contraction at the lower part of the neck, horizontally outwards from the upper

angle of the wound as far as and beyond the end of the first transplant, so that the end of the new flap might underlap the end of the first one. Then the axillary end of the bridge was cut through and the flap sutured into place. This united primarily wherever its edges came well into contact, and the rest healed by granulation.

By the 8th December the sore from which the transplant had been made had healed over, and the flap had settled into its place. She then left the hospital.

The results of these operations may be judged of by the results as seen in her own person at present and by the photos. The permanent improvement in her appearance is decided. The four operations had been spread over nearly fifteen months.

CASE 2. Sarah Ann C—, æt. 40, single, admitted March 13th, 1884. When five years of age she fell into the fire and burnt the left side of chest, the upper and forearm badly, and several other parts, but not so badly. The healing occupied six months.

She was admitted into St. Thomas's Hospital under my care for badly contracted cicatrices on the left side at the date above mentioned. The upper arm on its aspect towards the axilla and side of chest was strongly webbed to those parts, and the forearm was drawn to a right angle with the upper arm by the extension of the web down the inner side and front of the elbow (see Figs. 7 and 8). The photograph shows the extent and severity of the webbing.

The scar itself extended from the right side of the sternum across the chest and axillary fold to the upper arm and along the inner side and front of the upper arm, elbow, and forearm to the wrist, where it ended by adhesion over the tendon of the flexor carpi ulnaris.

The web was thick and cordy at its free edges. At the elbow it measured about two and a half inches from its edge to its base.

The deformity on the right side was not so bad as to warrant any surgical interference, but the condition of the left

arm had caused her to seek relief in operation. I explained the tedious and painful nature of the procedure. Nevertheless she determined to submit to it.

On April 26th I raised a bridge of skin from the outer

FIG. 7.—S. A. C— before operations, March, 1884. The web is well shown. The dotted lines indicate where the straps of skin were raised and their extent.

side of the shoulder and upper arm, fully eight inches in length and two and a quarter inches in width, measuring from just below the point of the acromion. This bridge

was a good substantial one. It was dressed in the usual manner, and the arm bandaged to the side. Owing to the length of the bridge and the recumbent position of the patient, there was a great tendency on the central part of the bridge to drop backwards. This part of the flap was therefore kept slung.

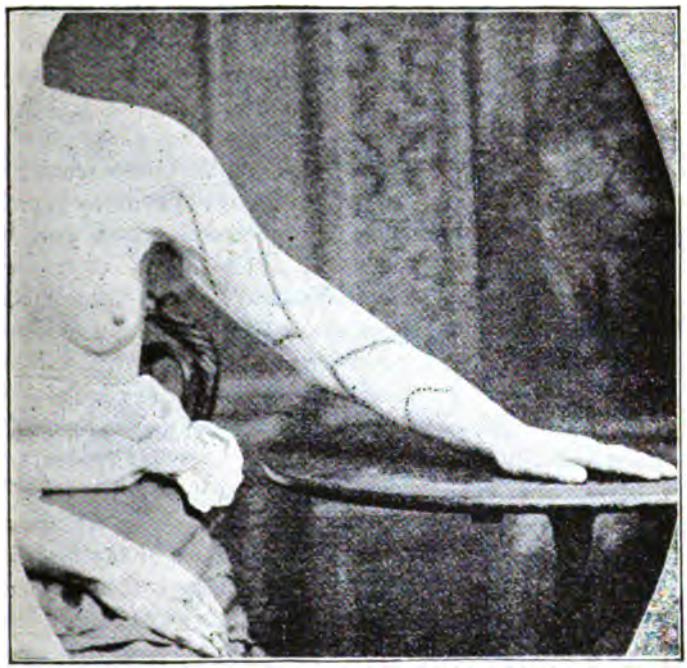

FIG. 8.—S. A. C—. This shows the greatly improved condition of the whole arm. The dotted lines show the situations into which the transplants have settled.

On May 12th, or the sixteenth day, the second stage of the operation was performed. An incision was commenced at the upper end of the anterior edge of the bridge and carried downwards and inwards across the web to the inner side of the elbow. This left a wide long wound. The lower end of the bridge was cut across (sufficiently low down

to give a long enough flap) and the flap was then transplanted. The free end and the upper edge of the flap were sutured carefully into place. Dressings as usual.

The anterior edge and end of the flap did not unite well, but little sloughs formed where the cicatricial tissue had been included, and the flap therefore threatened to slip from its position. Such spots of union as did happen, however, just served to anchor the flap, but plaster had to be used to assist in keeping the flap in its place. In a month's time the flap had united throughout its length and breadth, and the sore on the outer side of the arm had made good progress.

On August 7th, or about three months' time from the operation, she was well, and was sent to the country to pick up strength and spirit for the operation which was to relieve the contraction remaining at the elbow.

She was readmitted in October after the autumn holiday, and on October 25th I made the first step in the lower operation. A bridge of skin was raised from the outer side of the forearm, commencing above at the external condyle. This bridge measured five and a half inches in length and one and a half inches in breadth.

On November 8th, or on the fourteenth day, it was safe to proceed with the transplanting. An incision was made transversely across the web about the middle of the forearm (or just below it) and the upper edge of the scar was raised into a fringe. A wide wound was the consequence. The upper end of the bridge was now cut across, and the flap was turned downwards and across the forearm until its free end could be brought into contact by suture with the skin at the inner border of the forearm. These sutures and the others along the lower edge of the flap secured the flap in place. In due course good union took place.

As soon as the condition of the sore and scar on the arm allowed of it, an extension apparatus was fitted to the limb, and the elbow was gradually opened out until she could keep her arm in an almost perfectly extended position.

She left the hospital on February 21st, 1885, after less

than a year's treatment, in excellent health and spirits considering what she had gone through.

The photograph taken May 14th, 1885, shows very well the very improved state of the limb.

CASE 3.—Emily H—, æt. 22, admitted into St. Thomas's Hospital April 1st, 1886. She had been badly burnt by fire about the face, neck, and left arm when three years of age.

On admission she presented numerous superficial scars over the upper part of the face above the level of the mouth, but no deformity from contraction there. The lower part of the face, particularly the lower lip and chin, were very scarred and deformed. The line of junction of the mucous membrane with the skin of the lip was drawn down nearly to the chin, so that the red of the lip was everted and unsightly. The lips could be approximated when she made a determined effort to close the mouth, but ordinarily the lips did not meet, and left the teeth slightly exposed. The scarred skin of the chin was firmly drawn down towards the neck. The left angle of the mouth was tightly drawn downwards and outwards. The right side of the face was not so badly drawn (see Figs. 4, 5, and 6). There was not any dribbling from the mouth.

The left side of the *neck* presented the worst scarring and contraction. The chief contraction had occurred in the direction of a line from the angle of the mouth downwards and outwards to the middle of the clavicle. Here the scar was dense, and drawn into a frænum or fold about an inch and a half in depth. The scar extended, downwards over the clavicle, outwards to a line drawn from the angle of the jaw to the outer third of the clavicle, and inwards across the front of the neck to far round on the right side.

The head could not be bent over towards the right shoulder, and rotation towards the left side increased the deformity.

Left arm: There was a strong hard band in front of the elbow, which bound the forearm to the upper arm, so that it could not be extended much beyond a right angle.

She was anxious to have something done for each deformity. I explained that more than one operation would be required for the neck and for the arm respectively, and that she would have to remain under treatment for a long period, probably a year. She determined to submit to the ordeal. She was in good health and fresh from the country.

FIG. 4.—E. H.—before operation. From an old photograph. Shows how the lip was drawn down and everted and that the shoulder was drawn up.

On April 19th, 1886, the first stage of the operation on the neck was performed. A strap of skin was raised from the neck and shoulder. It measured nine inches in length and three inches in width, and extended from below the level of the mastoid process downwards and outwards to beyond the acromion and outer fourth of the clavicle. The bridge was dressed with oiled silk protective, warm carbolised oil, and salicylic wool. Bandages were applied, and the arm was confined to the side, but no rigid apparatus was applied. The wounds were treated in the usual manner, but the strap was unfortunately allowed to re-

unite to a slight extent at each end, and when the time came for transplanting the bridge was shorter by one inch than it was when first cut.

On the nineteenth day the second stage of the operation was undertaken. A long semilunar incision was made

FIG. 5.—E. H— after operations. The dotted lines show (1) the situation from which the strap was transplanted, and (2) the long broad transplant in its new position. The improvements in the face and its expression are also apparent.

across the scar on the left side of the neck to the limits of the scar on the right side. The wound bled freely. The external jugular vein was divided. The edges of the scar were dissected up above and below until they formed fringes an inch in depth. Next, the lower end of the bridge was dissected up for an inch, and then cut across, the granulating edges and under surface were pared for about one half the length of the flap, and the long sausage-shaped thing was transplanted into the wound. The end and upper edge were carefully sutured into position, and the

lower edge for a short distance was also fixed by sutures. The remaining two thirds of this lower edge were unattached on account of the great width of the wound at the corresponding part of the side of the neck.

A stranger to this mode of operating would have been

FIG. 6.—This shows the same as fig. 5. The improvements are more apparent.

very disappointed at the appearance of the parts at the completion of this operation, as the transplant looked so thick, clumsy, and narrow, and a considerable part of the fresh wound remained uncovered by flap.

Union followed nearly all along the upper edge of the flap, but the extreme end of it, which had been freshly dissected up (for reasons already stated) sloughed, and there, of course, union failed. However, the lower edge united well where it had been sutured. No retraction took place, and the flap kept its position satisfactorily. The rest of the flap healed and united readily, and by the eightieth day that part of the neck had healed over. By

that time the transplant had flattened down and regained its normal width, and it promised to spread still wider.

She was now sent away into the country to recruit her strength.

On the 20th March, 1887, she was readmitted. Her appearance had already greatly improved. All contraction on that side had disappeared. The transplant formed a wide, soft, flexible covering to the left side of the neck.

On the right side there was an ugly piece of scar where the end of the flap had sloughed, and the gap had been filled up by granulation and cicatrisation. This scar, together with the original contraction, prevented the lip from coming up into its place, and the angle of the mouth on the right side was still slightly drawn down.

On April 16th, 1887, another and smaller operation was performed with the object of relieving the traction on the lower lip and right angle of the mouth.

The scar was divided deeply by a horizontal incision, and the edges dissected up into fringes, and then a flap of three inches by two was raised from the posterior inferior angle of the neck. This was immediately inserted. It united readily and completely, and fulfilled our intentions satisfactorily.

Thirty-six days after this operation she again left for the country.

There remained the arm contraction to be relieved. She was so well satisfied with the results of the operations on her neck that she determined to return to us in the summer that the arm might be operated on.

She was readmitted on June 14th of the same year (1887). The web in front of the elbow extended from the middle of the upper arm along its inner side and front as far as the wrist and base of the thumb. This bound the forearm to the upper arm at an angle of 97°; opposite the elbow it measured about three inches and a quarter in depth from its free edge. The scar tissue was very marked on the inner side, where it extended beyond the internal condyle.

The outer surfaces of the upper arm, elbow, and forearm were free from scar tissue.

On July 14th the first stage of the operation was performed. A strap or bridge of skin was raised from the outer side of the upper and forearms with the intention of transplanting it obliquely across the front of the elbow-joint. It was eight inches in length and two and a half to three inches in width. Its centre was opposite the flexure of the elbow-joint. It was dressed and treated in the usual manner.

On the seventeenth day transplantation was accomplished. The web was cut completely across. This transverse incision was crossed by a short vertical one on the inner side, and the edges were dissected up until they formed fringes. Next the lower end of the bridge was severed, the edges and under surface for about one half of its length were pared, and then the flap was sutured into place. The distal half fitted accurately into the wound, but, as in the other cases, the lower edge of the proximal half could not be sutured at all. The end and edges united by primary union, and no sloughing occurred in that part of the transplant.

About half way along the lower edge a small slough happened, and that of course reduced the width of the flap in that situation.

Healing went on very satisfactorily, and in the middle of August she was able to bear to have an extension apparatus applied.

On October 19th she left the hospital for her home. The arm then was in a very improving and promising condition.

Case 5.—Emma W—, æt. 9, admitted January 13th, 1887. Badly burnt when two years of age (seven years ago) over right side and front of neck from below ear and chin down to the clavicle and left sterno-clavicular joint. The left side was not so extensively burnt as the right.

On admission she was observed to be rather short for nine years of age and not strong.

The deformity of the mouth and neck, in consequence of

the contraction of the cicatrix of the burn, was very marked and unsightly.

The right angle of the mouth and lower lip were drawn downwards and to the right side, so that the front lower teeth were exposed and inclined forwards and to the right. Saliva and mucus dribbled away, and it was only by a determined effort that she could keep her mouth closed.

The right side of the face was drawn down, and the right lower lid slightly everted. The chin was effaced, and the head, particularly on the right side, was tightly drawn down towards the clavicle and shoulders.

On the sides and front of the neck the scar tissue had become drawn into dense tight bands or frænа, which could be taken between the thumb and finger. There were four primary bands, one on the right side from the angle of the jaw to the clavicle, one on either side of the middle line, and a fourth on the left side. The greatest amount of contraction was from the symphysis of the jaw to the suprasternal notch.

First operation (February 26th, 1887).—A bridge of skin was raised from the side of the neck and shoulder eight inches long by nearly two inches and a half wide. The fat layer beneath the integument was thin. The fibres of the trapezius and deltoid were exposed. This was dressed in the usual manner. Retentive bandages were applied, but no rigid apparatus was put on for the purpose of preventing movements of the head and neck, as it was thought that the natural instincts of the patient would aid to prevent tension of the flap. However, in ten days' time I observed that the whole strap had narrowed, and that the central part of the strap, for nearly two inches, was thinning both in thickness and width. I attributed this partly to deficient general power and partly to mobility and tension of the flap. I therefore had an apparatus made in order to fix the head over to the right side. Mr. Ernst rapidly carried out this design. The ulceration was arrested in the strap, and when it became evident that no further improvement would take place in the nutrition of the whole strap,

on March 21st, or twenty-three days after the first operation, I performed the second.

An incision was made across the contracted scar from right to left, rather nearer the lower jaw than the clavicle. The upper and lower edges were raised, so that they formed fringes about an inch deep. Into this wound I transplanted the strap about seven inches long, or three times the width of the base, fixing the free end carefully by sutures, and suturing the whole length of the upper border and the anterior half of the lower border. The wound was dressed in the usual way.

No ulceration or sloughing took place. Good union followed between the free end of the flap and surrounding parts.

The sore on the shoulder healed slowly, and the child was rather weakly.

On May 15th she was sufficiently well to leave the hospital, as the sore on the shoulder had very nearly healed.

Readmitted June 28th. Transplant very healthy and stretching. Spots in the shoulder scar had reopened from friction or deficient nursing at home. She was able to leave in a month's time, on July 27th.

Readmitted October 21st same year, for sores on shoulder. She was kept in until December 14th, when she was again well enough to be discharged.

At this time the vertical scar to the right of the middle line showed a tendency to contract, and although the transplant stretched, considerable contracture remained at the side of the neck. Only a partial success. The transplant had not been long enough to reach across the middle line, as it had been originally designed to do.

May 14th.—The child remains under treatment; no further operation has been done.

July, 1889.—Improvement continues.

After the paper had been read, the patients were severally shown to the Society.

(For report of the discussion on this paper, see 'Proceedings of the Royal Medical and Chirurgical Society,' Third Series, vol. i, p. 124.)

A CASE OF GASTRO-ENTEROSTOMY,

TOGETHER WITH A

TABLE OF THE CASES HITHERTO RECORDED.

BY

HERBERT W. PAGE, M.C.CANTAB.,

SURGEON TO ST. MARY'S HOSPITAL; CONSULTING SURGEON TO THE CUMBERLAND INFIRMARY.

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If we may judge from the number of published cases, it would appear that the operation of gastro-enterostomy which was first undertaken by Woelfler in 1881 has been performed but seldom in this country. The reasons for this are not very obvious, for the operation has met with considerable and increasing success, and there can be no question that it is capable of bringing relief from the distressing symptoms incidental to pyloric occlusion in those cases where pylorectomy is not feasible, and of making the close of life more comfortable, free alike from vomiting and pain. It is my intention to give a short account of a case which was under the care of Dr. Lees and myself in St. Mary's Hospital at the beginning of last year, and then more especially to examine the cases which have been already published, and which I have brought together in the accompanying Table, in the hope that we may form some critical estimate of the operation, its dangers and its results, and secondly of eliciting from other surgeons their opinion as to its real value and prospects.

H. M—, æt. 48, a railway porter, was admitted into St. Mary's Hospital, on November 19th, 1887, under the care of Dr. Lees. He came of a healthy family, his father having lived to eighty-four. His own habits had been steady, and he had uniformly enjoyed good health until an attack of jaundice four years ago, from which illness in his own opinion he had never quite recovered. A year after this he was seized with obstinate, yet painless, vomiting, especially at night. He seems to have been subject to occasional vomiting ever since, but for the last six or eight weeks the sickness had become much worse, and during this time he had certainly been losing flesh; he had had to leave his work, and had been much in bed. The circulatory, respiratory, and urinary systems were all healthy, but he looked somewhat anæmic and worn, and he was unquestionably thin. His spirits were good, and he was wishful to have something done for his relief. There was nothing noticeable about the abdomen, but an inch above the umbilicus there was to be felt a thick lemon-shaped lump, movable on manipulation, seemingly about four inches in length, and lying transversely across the middle line. There was no tenderness. The stomach was very decidedly dilated. The vomited matter measured a pint or more each time, was acid, with an extremely sour penetrating smell, and contained sarcinæ. On December 3rd his stomach was well washed out with warm water which brought away a large quantity of matter, so thick and sticky as often to block the tube. His weight on December 9th was 8 st. 13¼ lbs.

The diagnosis of cancer of the pylorus having been made, I was asked to see him on December 14th, and the case being deemed a favorable one for operation, at any rate for exploration with a view either to pylorectomy or gastro-enterostomy, he was transferred to my care on December 19th. He weighed on that day 9 st. His stomach had been washed out twice daily since the 14th, and it was now decided, preparatory to the operation, to wash it out three times a day, the last injection on each occasion to contain ten grains of salicylate of soda. This repeated washing

clearly had great influence in altering the character of the vomited matter. A final washing was carried out on December 21st, two hours before the operation. This was begun at two o'clock, the abdominal wall having been carefully cleansed beforehand, and every precaution being taken to keep the patient warm, and to protect exposed bowel by hot aseptic cloths. Spray was not used. The abdomen having been opened by a four-inch median incision above the umbilicus, a portion of the great omentum immediately protruded. The tumour was found lying exactly across the centre of the wound. In size it was a good handful, involving the pylorus, and stretching some three inches on the anterior wall of the stomach. Behind it there was a mass of enlarged glands which pulsated over the aorta. Pylorectomy being out of the question, I proceeded at once to gastro-enterostomy, following the directions of Mr. Barker as given in the account of his successful case in the 'British Medical Journal,' February, 1886.

Very considerable difficulty and delay were experienced in getting the stomach forwards out of the wound, and also in adjusting between the fingers which held them the stomach wall and the chosen piece of bowel. This was believed to be a piece of jejunum, for it had been followed down, as I then thought, from the duodenum with the finger and so hooked forwards. The bit of bowel was easily isolated with india-rubber bands passed through the mesentery, but the strain upon it, in order to hold it in contact with the stomach was very considerable. An incision, an inch and a quarter in length was then made in the axis of both bowel and stomach, through serous and muscular coats only. From the stomach there was no bleeding, but that from the bowel was very troublesome, ligatures having to be applied after failure and much delay from pressure. The posterior edges of the divided coats of stomach and bowel having been next united by Woelfler's suture, extending half an inch beyond the incision at each end, the stomach was opened with scissors; and again there was very troublesome and rather profuse bleeding

which had to be arrested by ligatures. A small quantity of mucus alone escaped when the gut was now opened in a similar way. Without difficulty the anterior lips were then united by Czerny's suture, and this accomplished, a row of Lembert's sutures one sixth of a inch apart was placed all round, at a distance of half an inch from the incision, and at the extremities somewhat farther, so as to avoid all risks of kinking. Some sixty sutures were used, the material being the finest twisted Chinese silk, threaded on fine round sewing needles.

The elastic bands having been released, I was concerned to find that the mesentery and peritoneal covering of the bowel had been torn by the stretching in four places. Three of the rents were small, but one was an inch in length and quite exposed the muscular coat of the bowel. Each was accurately closed with Lembert's suture. Having been carefully wiped, the parts were returned into the abdomen, and there no longer seemed to be the least tension. The peritoneal cavity was finally washed out with sterilised water at a temperature of 100° F. The abdominal wound was closed in the usual way.

The man bore the operation extremely well; his pulse was good, and he was quite warm at the end of it. The operation had lasted, I am sorry to say, three hours and forty minutes, the long time it had taken having been due to several causes; to the bleeding which has been named, to the difficulty in drawing out the stomach and in adjusting it and the bowel together, and to the necessity of suturing the rents in the mesentery.

It is unnecessary to dwell at any length on the after history of the patient. He lived for ten weeks and two days, and although during this period his condition, as far as comfort was concerned, was vastly different from what it was before the operation, for he was greatly relieved from vomiting and nausea, his breath became sweet, his tongue was clean, and he enjoyed his food, yet nevertheless his weight did not increase, and it was obvious at the end of six weeks that he was losing rather than gaining ground.

From the operation he had rallied without untoward symptom or the least rise of temperature. For the first four days he was fed entirely by enema, and then began to have milk, barley-water, and brandy by the mouth. The wound was dressed for the first time on December 28th and found to be soundly healed. On December 29th he had some chicken broth and on the two following days boiled chicken in addition to milk, barley water, and Mellin's food. On January 2nd and 3rd he was troubled with vomiting, and at one time brought up as much as a pint and a half. This was relieved by washing out the stomach. Gradually he was able to take more food, but this must be said, that throughout the rest of his life any very solid food did not seem to pass readily out of the stomach. What he most liked was the chewing of underdone steak. On January 7th he sat up, and ten days later dressed himself. He had been markedly improving, was more cheerful, enjoyed his food, and was free from sickness. His diet consisted of chicken, raw steak, Brand's essence, koumiss, which he much preferred to milk, biscuits and toast, eggs, bread and butter, rice in milk. These various things he ate with almost too much enjoyment, as if he were anxious to make up for lost time. Flatulence was his chief trouble, but was efficiently relieved by a drop of creasote every four or five hours. Notwithstanding his improvement in many respects, his weight on January 19th was found to have fallen eight pounds since the operation, and this grievously depressed him. Again on February 2nd there was another fall of half a pound, although he had been seemingly doing well and had been gaining strength, as estimated by what he could do in the way of dressing himself and moving about in the ward. The middle of February saw a return, for two or three days, of the sickness, not to the same extent as before, but yet enough to distress him considerably, and he was clearly getting weaker. February 24th was his last time up, and from this day onwards he gradually sank, being quite free from pain and vomiting. He died rather suddenly on March 3rd, seventy-two days after the operation.

The necropsy was made by Mr. Silcock, who reported as follows:

Omentum strongly adherent to under surface of the wound in its whole length. The colon was much distended with gas and fluid. Only a small portion of the left lobe of the liver was visible, its anterior edge being one and a half finger's breadth below the ensiform cartilage, united with the omentum, subjacent portion of stomach, and upper extremity of the wound by tough adhesions. The transverse mesocolon was shortened, puckered, thickened, and adherent to the growth in the stomach. The coil of intestine which was attached to the stomach was a portion of the ileum nine inches from its lower end. The mesenteric glands were slightly enlarged. After removal of the stomach it was found that the viscus had to be very greatly distended before fluid was made to pass through the opening into the stomach, but no fluid could be forced through the pyloric orifice when that in the ileum was closed. When partially dilated the stomach measured eleven inches from the cardiac end to the pylorus. On opening the stomach the orifice between it and the ileum was found to be about the size of a threepenny piece, admitting the tip of the little finger. It was situated on the anterior surface of the stomach, half an inch below the point of junction of the lower edge of the left lobe of the liver with the stomach wall, and about two and a half inches to the left of the upper limit of the growth. This involved the whole of the pyloric end of the stomach, as a firm mass measuring three inches by two inches, encroaching upon the stomach in an upward direction, and adherent to the parts around. Some enlarged glands were found on the under surface of the duodenum. The other parts of the body demand no special comment.

I do not propose to give any account of the steps of this operation, gastro-enterostomy; first of all because my own experience of it is obviously insufficient, and secondly because this has already been done, as fully and exhaustively as it could be done, in the well-known Monograph of von

Hacker, "Zur Casuistik und Statistik der Magenresectionen" ('Archiv für klin. Chir.,' 1885, Bd. xxxii, p. 616); and more recently by Dr. C. Rockwitz, "Die Gastroenterostomien an der Strassburger chirurgischen Klinik" ('Deut. Zeitschrift für Chir.,' Bd. xxv, 1887, p. 502). As a more profitable course I shall consider the table of cases, and see what lessons may be learned therefrom. Before doing so, however, I should like to refer to that which I can only regard as a blot in the case just recorded, the unfortunate circumstance that the portion of bowel attached to the stomach was at the wrong end of the small intestine, a portion of the lowest ileum instead of jejunum. It seems practically certain that the man might have lived a great deal longer had the food which left his stomach been subjected to the natural processes of digestion and absorption in the alimentary canal. As it was, his food, of which no lack was taken, did him little or no good, and the explanation of this lies in the fact recorded. Precisely the same accident has more recently befallen Lauenstein, whose name appears three times in the table of cases, ('Centrlbl. für Chir.,' 1888, p. 472). Having opened the abdomen and found that pylorectomy was out of the question, he chose a piece of moderately distended small intestine lying immediately below the transverse colon, and this he sutured to the front of the stomach. The patient bore the operation perfectly, but on the fourth day began to have profuse diarrhœa, and food which had been swallowed only half an hour before was on more than one occasion found unchanged in the stools. (Case 35, Table). The woman got rapidly weaker and weaker and died on the eleventh day, and then it was found, as Lauenstein had suspected, that the opening in the gut was quite low down, 40 cm. (15 in.) in fact from the ileo-cæcal valve. The greater portion of the small intestine was empty. In one of Lauenstein's other cases (13 Appendix) the sutured piece of gut was found to be two metres below the duodenum, and in a recent case to which Senn referred at the Congress of American Physicians and Surgeons the bowel sutured

was eight feet below the pylorus. In all the remaining cases where the fact is specially mentioned the upper end of the ileum, if not the jejunum itself, had been properly joined to the stomach wall. It can only be in exceptional cases, therefore, that the piece of intestine, chosen after the manner recommended in von Hacker's Monograph, shall turn out, by an unfortunate and unusual disposition of the intestinal coils, to be something other than it was thought to be. To push the omentum aside, to feel for and follow the duodenum and then take up what seems to be a piece of jejunum is obviously insufficient and uncertain, and both Lauenstein's case and my own show that it is a matter of supreme importance to choose a high piece of small bowel.

The mode of choosing a coil is dealt with at some length by Rockwitz in his paper on gastro-enterostomy, and he comes to the conclusion that in the interests of antisepsis any prolonged search for a piece of jejunum is to be avoided, and that we should rather choose a suitable coil which can be conveniently sutured. The direction of this coil may be definitely determined, if it is so wished, by exciting reverse peristalsis by touching the bowel with common salt, after the method of Nothnagel, but it is obvious that the convenient coil eventually may turn out, to the detriment of the patient, to be at the wrong end of the small intestine. The accident has occurred twice already in a comparatively small number of cases; and as the result may be disastrous, I feel sure that the surgeon will do well, somehow or other, to make sure what portion of bowel he is going to suture. In his paper Lauenstein speaks of a large incision in the abdominal wall and more definite search for the duodeno-jejunal fold. Neither can add much, if at all, to the risks of the operation. The longer incision may be unnecessary, but the necessity of an accurate choice of bowel is unquestionable in the light of these two cases, and the surgeon must clearly not rest content with choosing the bit of gut which is merely the most convenient, or which seems to be right because it is lying just below the colon and has appeared to be continuous with the duodenum. In my

own case I felt no doubt at the time that I had got hold of the proper piece of bowel, and although it may be an unusual thing for the lower end of the ileum to be lying near the stomach, yet the possibility of it must be borne in mind, so that suture of a wrong piece may be avoided in any future operation. It would be very much better to trace the bowel up from the lower end and so make sure that that part has not been chosen, and at any part we can always determine the direction of the gut by that method of tracing the mesentery to its attachment which was originally recommended by Dr. Frank Rand. ('Lancet,' December 22nd, 1883.)

Let us now turn to the Table of Cases. These are thirty-nine in number, exclusive of two where pylorectomy and gastro-enterostomy were done at the same time, and four by Senn, to which a merely casual reference is made in the 'British Medical Journal' in an account of the recent meeting of the American Congress of Physicians and Surgeons (vol. ii, 1888, p. 1008[1]), and from which no sufficient details can be gathered.

Of the thirty-nine cases of gastro-enterostomy recorded in the Table, fifteen died directly or indirectly as the consequence of the operation; directly as *e. g.* from collapse; or indirectly, as from a kink and obstruction, or from suppurative peritonitis, in the course of a few days. In endeavouring to arrive at the rate of mortality it is clearly unfair and

[1] The reference to Dr. Senn's cases is to be found in the epitome of his speech at the Congress, and is in these words:—"The author had in the past eight months performed gastro-enterostomy in four cases by this method (by means of decalcified bone plates); in all of these cases the operation was a success, although in one case the patient died because the operation had been postponed too long. In one case the advice of Lücke had been followed, and the first presenting portion of the bowel had been fastened to the stomach. The patient continued in good condition for nine days when symptoms of obstruction came on, and he died in three weeks. It was found that the connection with the bowel was eight feet below the pyloric orifice, and that the movements of the bowel had produced a sharp flexion of the intestine causing obstruction. Gastro-enterostomy in incurable carcinoma was a safe operation, and one which the surgeon owed to all such patients; it was the best operation."

misleading to regard a case as successful simply because the patient got over the immediate effects of the operation; and in counting fifteen cases as unsuccessful I have taken all the circumstances of each into careful consideration. In the post-mortem record of these fifteen cases the word peritonitis occurs seven times only, striking evidence that with proper precautions this source of danger and death may be almost certainly excluded. Exhaustion, collapse, shock, diarrhœa, continued vomiting, these are the most frequent expressions in the records of the other fatal cases, and they show what really are the chief dangers which have to be met. In other words, it is probably more a question of suitability of the particular case for operation than of special dexterity on the part of the operator. In making this remark I do not exclude my own case from my mind. Firstly, as far as age is concerned: the average age of the fatal cases was rather more than forty-six years, viz. forty-six and one third exactly, while that of the successful cases was a little over thirty-eight and a half years—no very great difference. More important in all probability is the degree of wasting and exhaustion at the time of operation. Upon this point it is impossible to speak with certainty, for the records do not enable us to draw comparisons between the several cases in these particulars. Nor is there sufficient evidence at our disposal for forming a conclusion as to the influence which the length of time spent over each operation may have had upon the result. We know enough, however, to say that prolonged exposure and anæsthesia must have a large share in determining the amount of collapse afterwards. In my own case much time was lost in arresting hæmorrhage, but even in the absence of this and of such other special circumstances as caused delay in that instance, the necessity of having to put in as many as sixty sutures in order to ensure perfect apposition and to prevent future kinking must always be a very long business. And here I think a very great improvement in the operation is likely to follow from use of the decalcified bone plates which have been introduced and recommended by Senn, and the ac-

count of which in the 'Annals of Surgery' (vol. vii, 1888, pp. 1, 99, 171, 264, 367, 421) seems to leave no doubt that approximation of bowel and gut may be thereby very much simplified, and may be finished with safety in a much shorter time. In any future operation I should feel strongly inclined to use these plates, for the numerous experiments made with them by Senn on animals bear conclusive testimony to their exceeding value. They were used by Senn himself in the four cases to which brief reference has been already made, and by Ransohoff in Case 39 of the appended Table.

The unsuccessful cases and the causes of death are as follows:

Case 2. Vomiting and spur, fatal in ten days,

Case 3. Exhaustion, fatal in three days.

Case 4. Hæmorrhage and collapse, fatal in four days.

Case 6. Fæcal vomiting, sutures gave way, fatal in two days.

Case 8. Collapse, purulent peritonitis, fatal in four days.

Case 9. Suppurative peritonitis, fatal in twelve days.

Case 11. Collapse, commencing peritonitis, fatal the same day.

Case 12. Collapse, fatal the same day.

Case 16. Return of vomiting. Exhaustion, fatal in eighteen days.

Case 17. Collapse, commencing peritonitis, fatal in fourteen and a half hours.

Case 20. Collapse, commencing peritonitis, fatal in twenty-three hours.

Case 21. Collapse, peritonitis, fatal in thirty-six hours.

Case 22. Perforative peritonitis, fatal in twenty-four hours.

Case 31. Kink, fatal in ten days.

Case 35. Exhaustion. Opening too low, fatal in eleven days.

Here are fifteen cases in all, and the words collapse or exhaustion occur the most frequently. Of these fifteen cases one, No. 20, was the subject of recurrent cancer after

pylorectomy a year before, a circumstance in itself sufficient, one would think, to make the case an unfavorable one for gastro-enterostomy. Amongst the remaining fourteen, five, viz. Cases 2, 4, 22, 31, and 35, were fatal, it may be said, from unfortunate or unavoidable accidents; and of the nine others, having an average age of forty-three, Case 3 is admitted by the operator himself to have been unsuitable, "operated on too late"; Case 6 was one of very extensive disease in a man aged fifty, the pancreas being involved in the malignant mass; Case 8 had had incessant vomiting for five months, the stomach was much dilated and there was extensive disease, all indicative of great feebleness at the time of operation; Case 11 died from shock the same evening, a circumstance not explained by any data recorded, and surely most unfortunate in a man aged thirty-six, with cicatricial constriction not due to cancer; Case 12 also from early collapse after having been ill a year; Case 16 from gradual exhaustion, the patient having had constant vomiting, dilated stomach, and extensive disease; Case 17 from collapse in fourteen and a half hours; and Case 21 from collapse in thirty-six hours, the phrases "great anæmia" and "wasting" suggesting at any rate that the patient was in a very feeble condition when the operation was undertaken.

These facts only serve to show how all-important it is to undertake gastro-enterostomy in those cases only where the exhaustion from vomiting and want of food and the amount of the pyloric disease have made no very great advances. This is a self-evident truth, applicable not more to gastro-enterostomy than to many other operations in surgery.

Turn we now to the other side of the picture. First of all it is satisfactory to note that with increasing experience, with greater care perhaps in the choice of suitable cases, and in better operative methods the rate of mortality has steadily declined. Thus in the first twenty cases, with an average age of exactly forty (excluding Case 18 in which the age is not given) there were ten deaths; while in the

second nineteen cases, with an average of rather less than forty-three and a half, there were only five deaths. It is true that the numbers are few, and that the conclusion may consequently be erroneous, but the result is such as we have been wont to see in the history of other operations. In this second period fall the marvellous series of cases by Lücke of Strassburg, seven in number, all successful.

Then, moreover, if the operation may be undertaken with a fair promise of success in well-chosen cases, what do the successful cases themselves tell us may be gained by it? Not cure, it is true, but relief from the torments of starvation and incessant vomiting, and with these benefits the prolongation of life. In what mortal and irremovable disease can a patient hope for more? Take the case which has been as successful as any other in the list, that of Mr. Barker (Case 25), where the patient lived for twelve months and one week, with much comfort and fair enjoyment of life until shortly before the closing scene. On these points the Table does not speak with the fulness that could be wished, for many surgeons have published their cases without waiting for the ultimate result, and in rare instances only has this been subsequently recorded.

Look, however, at Cases 5, 10, 14, 18, 24, 25, 28, 29, 30, 32 and 36 for records of unquestionable improvement, and with the improvement who can doubt that there was in all probability prolongation of life?

I think that gastro-enterostomy is worthy of more attention in this country than has been hitherto paid to it. The recorded cases lead me to the conclusion that the operation is distinctly justifiable, and one which the surgeon may recommend with a clear conscience, provided always that the patient appreciates the risk, and understands that relief from his symptoms, not cure from his disease, can alone be given him.

Table of Cases of

No.	Surgeon.	Reference.	Sex.	Age.	Disease.	Duration and symptoms.	Date of operation.
1	Wölfler	Centrlb. für Chir., Nov. 12, 1881, p. 705	M.	38	Cancer of pylorus, size of lemon, involving ligt. hepato-duodenale and head of pancreas	Three months. Constant vomiting and loss of flesh	Sept. 28, 1881
2	Billroth	von Hacker's "Magen operationen an Prof. Billroth's Klin.," Wien, 1886, p. 64	M.	45	Cancer of pylorus, stretching along the posterior wall of the stomach and the lesser curvature in nodules almost up to the cardiac end	Four months. Vomiting, pain, constipation, wasting; epigastric tumour to be felt	Oct. 2, 1881
3	Lauenstein	C. für Chir., 1882, p. 758, and Arch. für klin. Chir., 1882, vol. xxviii, Hft. 2	M.	50	Cancer of pylorus, with much gland involvement	Six months. Failure of health and loss of 51 lbs. in ½ year. At work up to 10 weeks before operation	Dec. 15, 1881
4	Rydygier	C. für Chir., 1883, p. 241	M.	54	Pyloric tumour, size of apple, and much involvement of stomach and glands	Two years indigestion. Latterly fluids only taken, and much vomiting suffered	May 13, 1882
5	Lücke	D. Zeitschrift für Chir., 1882, Bd. xvii, p. 573, and C. für Chir., 1882, p. 855	F.	31	Cancer of pylorus adherent to gall-bladder and head of pancreas	Six or seven months. Dilated stomach; tumour to be felt. A year before had oöphorectomy for myoma of uterus	May 25, 1882
6	Kocher	Korrespondenzbl. für Schweizer Aerzte, 1883, No. 23	M.	50	Cancer of pylorus, involving glands and neighbouring peritoneum	No data	June 5, 1882

Gastro-enterostomy.

Operation.	Result.	Remarks as to effect of operation or necropsy.	Later history.
Transverse incision 22 centimetres long a thumb's breadth above the umbilicus. A coil of small intestine united by modified Lembert suture to anterior surface of stomach, a finger's breadth above the gastrocolic ligament at the greater curvature. An opening 5 centimetres long	Recovered	Vomiting ceased at once. More fluid was taken day by day, and on the 8th day solid food; well-formed stools. On the 17th day the wound had opened from over exertion, and the abdomen had to be washed out again. After this went down hill	Died on 30th October from marasmus (von Hacker's monograph). P.M.—Union firm; opening 2 centimetres wide; tubercular ulceration of lower ileum.
Transverse incision as in Case 1. The great omentum was in the way, and a portion of it was therefore removed by the thermocautery after ligature in four places. A coil of jejunum was then sutured to front of stomach	Died in 10 days	Bilious vomiting, soon becoming fæcal in odour, began the day after, and lasted till the end. P.M.—Firm union of jejunum, opening size of 6d. Vomiting explained by the formation of a spur, which had directed the bile right into the stomach, and offered impediment to the exit of food from the stomach into the distal part of the gut. Commencing pneumonia	—
Vertical incision 14 centimetres long a little to right of linea alba	Died in 3 days	No peritonitis. Piece of jejunum 45 centimetres from the lower duodenal curve	Lauenstein himself says that the operation was undertaken too late.
Prepared by salicylic washing of stomach. Vertical incision as in Case 3; catgut sutures	Died on 4th day	Did well for 3 days; then sudden pain and collapse after copious dark motion. There had been extensive hæmorrhage from the stomach. All parts healed and union sound	At the operation it had been thought sufficient to stop any bleeding by the pressure of the hands, no ligatures being used. The weakness of the patient had then reduced the bleeding to a minimum.
During the operation the stomach and bowel were kept in apposition by a clamp	Recovered	Discharged from hospital in 37 days, and by August had gained 7 lbs. No alteration in tumour	She lived 14 months after the operation in comfort, and able to attend to her household work. No necropsy.
Wölfler's	Died in 2 days	Fæcal vomiting and giving way of sutures. Necropsy partial only. Pancreas involved	—

No.	Surgeon.	Reference.	Sex.	Age.	Disease.	Duration and symptoms.	Date of operation.
7	Lauenstein	Verhandlungen der deutschen Chirurgen Congress, 1883, p. 24	F.	25	Cancer of pylorus, glued to the liver	No data	1883
8	Billroth	von Hacker's Monograph	F.	42	Cancer of pylorus, involving ligt. hepato-duodenale, the lesser omentum, and the gall bladder	Constipation for many years; frequent vomiting for 5 months; dilated stomach. Tumour felt in epigastrium	Sept. 5, 1883
9	Courvoisier	C. für Chirurgie, 1883, p. 794	F.	56	Cancer of pylorus, involving glands, transverse colon, head of pancreas, and the ligt. hepato-duodenale	Two years ago "catarrh of stomach." Return for last 6 weeks. Operation delayed 5 weeks after admission, as patient would not agree. No dilatation of stomach	Oct. 19, 1883
10	Rydygier	C. für Chir., 1884; Chirurgen Congress, p. 63	M.	20	Stenosis of duodenum from ulcer	Vomiting of blood and food for 4 or 5 years. Dilatation of stomach relieved by washing out. Diagnosis was ulcer of pylorus; it really was ulcer of duodenum	March 13, 1884 (?)
11	Monastyrski	C. für Chir., 1884, p. 352	M.	36	Pyloric stricture from sulphuric acid	No data	1884
12	Ransohoff	Medical News, 1884, p. 578	M.	34	Cancer of pylorus	Ill 1 year	April 12, 1884
13	Billroth	von Hacker's Monograph	M.	37	Tubercular stricture at junction of duodenum and jejunum; many glands involved	For 3 years pain in stomach, vomiting, and diarrhœa; general failure of health; stomach dilated	May 11, 1884

Operation.	Result.	Remarks as to effect of operation or necropsy.	Later history.
Wölfler's	Recovered	Symptoms of pyloric stenosis removed, but constipation continued	Died in 4 weeks from exhaustion. Piece sutured was 2 metres below the duodenum. The transverse colon had been slightly compressed.
Wölfler's. Transverse epigastric incision. Jejunum to front of stomach; opening 5 centimetres	Died in 4 days	Gradually sank. Some purulent peritoneal infiltration found of the submucous and subserous layers between the two rows of sutures. Jejunum sutured 22 centimetres below the fold	—
Transverse incision above umbilicus. The proper flexure of bowel could not be found, and therefore an opening was made in the adherent mesentery and transverse meso-colon, and a piece of intestine was then sutured to the posterior surface of the stomach near the greater curvature and 3 centimetres from the coronary artery	Died on Nov. 1	Went on well till 27th October, when symptoms of peritonitis arose, with frequent vomiting and tympanitis	Necropsy. Diffuse phlegmonous infiltration in right rectus; union of gut to stomach firm (jejunum), but in the omentum was a fist-sized stinking gaseous abscess. This case seems to be referred to by some writers as one in which the transverse colon became gangrenous from pressure.
Median incision. Piece of gut, 40 centimetres from the duodeno-jejunal curve united to greater curvature; Kürschnernaht and Lembert; opening 5 centimetres	Recovered	Steady improvement in health and strength as known for several months	Recovery from the operation somewhat delayed by small abscess in abdominal wall, and also in the parotid gland, which needed incision.
Median incision. Wölfler's; jejunum to greater curvature; catgut sutures	Died	From shock same evening. Union secured, but peritonitis beginning	—
Wölfler's	Died	In 8 hours, of collapse	No record as to what part of the gut had been opened.
Jejunum sutured to front of stomach	Recovered	In 1 month had gained about 21 lbs. in weight. On eighth day wound gave way and had to be re-sutured. After this "tuberculosis of lungs" set in, and diarrhœa	Died in rather less than 2 months. Necropsy. Extensive disease of lungs. Immediately under the wound a small suppurating cavity and some local peritonitis.

No.	Surgeon.	Reference.	Sex.	Age.	Disease.	Duration and symptoms.	Date of operation.
14	Socin	C. für Chir., 1885, p. 157	F.	43	Carcinoma of stomach	Recurrent. Pylorectomy had been performed 9 months before; rapidly increasing obstruction	June 5, 1884
15	Rydygier	C. für Chir., 1885, p. 476	M.	32	Cancer of pylorus, adherent to liver and gall-bladder	For 1 year increasing vomiting. Dilatation of stomach; no tumour to be felt	July 26, 1884
16	Lücke	D. Zeitschrift für Chirurgie, Bd. xxv, 1887, p. 511, *et seq.* paper by Rockwitz	F.	46	Cancer of pylorus, adherent to liver and pancreas	Indigestion for 5 years. Recently vomiting in large amounts; dilated stomach; constipation; tumour to be felt	Nov. 3, 1884
17	Billroth	von Hacker's Monograph	M.	33	Cancer of pylorus, adherent to pancreas and liver	For 6 months indigestion, constipation, vomiting, wasting; tumour to be felt	Dec. 10, 1884
18	Hahn	C. für Chir., 1887, Verhandlungen der deutschen Chirurgen Congress, p. 56	M.	—	Supposed cancer of pylorus	Fluids only taken in small quantities; great loss of flesh	1885
19	Billroth	von Hacker's Monograph	F.	48	Cancer of pylorus	For 6 months vomiting. Much wasting; well-marked tumour to be felt	Feb. 21, 1885
20	Billroth	Ibid.	F.	40	Recurrent cancer after pylorectomy, done on Feb. 26, 1884	At work for a time after the pylorectomy. Return of vomiting for past 3 months	Mar. 3, 1885
21	von Hacker	Ibid., and in Arch. für deutsch. Chir., xxxii, p. 623	M.	49	Cancer of pylorus. Fixed posteriorly	For 9 months constant pain and vomiting. Great wasting; patient had the delusion that a beast was in his stomach	Mar. 22, 1885

Operation.	Result.	Remarks as to effect of operation or necropsy.	Later history.
Median incision. Jejunum 30 centimetres from the fold joined to stomach. Fistula 6 centimetres long	Recovered	Was out of bed in 12 days, and in 4 months had gained 10½ lbs.	The first case in which both operations had been done. After history not published.
Wölfler's. "Kürschnernaht."	Recovered	Very favorable. Left the hospital in 37 days. Natural motion on 11th day	—
Median incision	Died in 18 days	Did well for 4 days, then vomiting returned and weakness increased. Necropsy; suture holes slightly torn by traction; transverse colon somewhat constricted by crossing gut	—
Oblique incision to right of the umbilicus	Died	In 14½ hours from collapse. Necropsy; jejunum to anterior wall of stomach; commencing peritonitis	—
Wölfler's	Recovered	Rapidly gained flesh. Patient shown two years after at the German Congress	The diagnosis of cancer doubted because of the result.
Median incision; jejunum to front of stomach; long and difficult, because of adhesions of great omentum to transverse colon	Recovered	Vomiting ceased. Gained weight, and discharged in 5 weeks	Died in 4 months. Renewed vomiting and wasting; no necropsy
Median incision; prolonged trouble from adhesions; jejunum to posterior of stomach through an opening in the much-adherent transverse meso-colon	Died in 23 hours	Shock and peritonitis	—
Linea alba. An incision parallel to the vessels was made through the transverse meso-colon, the margins of this opening were sutured to the stomach, and through it the jejunum was sutured to the stomach posterior wall	Died in 36 hours	Collapse and peritonitis; great anæmia	—

No.	Surgeon.	Reference.	Sex.	Age.	Disease.	Duration and symptoms.	Date of operation.
22	Hahn	Berliner kl. Wochenschrift, 1885, No. 51	M.	45	Cancer of pylorus	Two years. Great wasting	Aug. 7, 1885
23	Hahn	Ibid.	M.	46	Cancer of pylorus adherent to parts around	Indigestion, vomiting, wasting. Lost 18 lbs. in one period of 3 weeks	Aug. 23, 1885
24	Lücke	Same as Case 16	F.	22	Freely movable tumour of pylorus. The word "cancer" not used	For 10 months indigestion, vomiting, constipation, wasting; washing out relieved	Nov. 25, 1885
25	Barker	Brit. Med. Journ., vol. i, 1886, p. 293, and vol. i, 1887, p. 776	F.	37	Cancer of pylorus, with a few enlarged glands	For 18 months sickness, vomiting, and pain. A lump noticed for 5 months	Jan. 5, 1886
26	Lücke	Same as Case 16	F.	45	Cancer of pylorus	For 7 months, at least, vomiting, pain in epigastrium, and wasting; stomach dilated	Jan. 24, 1886
27	Lücke	Ibid.	M.	48	Cancer of pylorus, involving posterior wall of stomach and many glands	For 4 weeks constipation and vomiting, with fæcal smell; stomach large, but no tumour felt. After several weeks' washing out a tumour felt; rapid wasting	Mar. 30, 1886
28	Lücke	Ibid.	M.	25	Cicatricial stricture of pylorus	Vomiting, pain, and wasting for 12 months. No tumour felt until shortly before operation	April 3, 1886

Operation.	Result.	Remarks as to effect of operation or necropsy.	Later history.
Wölfler's, without anæsthetic	Died in 24 hours	From perforative peritonitis. Perforation not at site of suture, but from hole (?) made by forceps. Beginning of jejunum sutured	—
Wölfler's	Recovered	Gained rapidly in weight	—
Median incision; Wölfler's; seventy silk Lembert sutures	Recovered	Much shock at first, but rapid improvement after third day. Discharged in 3 weeks, having gained 19 lbs.	Four months later had gained 20 lbs. and looked well; well also at end of 7 months
Median incision. His own modification of Wölfler	Recovered	Slight vomiting for 2 days, relieved by change of posture; steady improvement after. Sat up on 17th day	The first English case. Much comfort for 8 months, when she began to fail. Tumour ultimately adhered to abdominal wall and burst externally. Lived 53 weeks. No necropsy. Clearly much benefit, and probably prolongation of life.
Median incision. Wölfler's. As in Case 24	Recovered	Much collapse. Vomiting distinctly fæcal at first. Washing out stomach and aperients relieved. Then improved, and left hospital on March 4, having gained 5 lbs.	Died on June 20, having had return of symptoms for some weeks. Necropsy. Great extension of disease involving the orifice. The passage along the bowel was very difficult from the presence of a spur. Thus the duodenal part was much dilated and the rest collapsed. Pylorus quite closed.
Median incision. Wölfler's	Recovered	Rapid improvement; 6th day, meat; 7th stool; 12th, up. Discharged April 15	Returned on June 19 very ill and died June 21. Necropsy. Great extension of disease and around the opening, but passage quite free both ways. Jejunum had been opened 15 centimetres only from the duodenum
Middle line above and below umbilicus. Wölfler's. The abdomen was sponged out with weak perchloride solution. Drainage-tube used	Recovered	Shock and pain at first, and some soreness of gums. From 8th to 12th day bilious vomiting relieved by washing out. Discharged May 23	In May, 1887, a good account of him; no tumour to be felt. Had gained 13 kilogrammes in weight

No.	Surgeon.	Reference.	Sex.	Age.	Disease.	Duration and symptoms.	Date of operation.
29	Lücke	Same as Case 16	F.	47	Cancer of pylorus, involving also posterior wall of stomach, peritoneum, and glands	For 1 year, indigestion, vomiting, and loss of flesh	June 2, 1886
30	Lücke	Ibid.	F.	39	Tumour of uncertain character in region of gall-bladder	For 2½ years, pain in hepatic region, and jaundice. For 2 months, severe pain, copious vomiting, and wasting	June 12, 1886
31	Jessett	B. M. J., vol. 1, 1888, p. 78, and Lancet, vol. i, 1888, p. 663	M.	50	Pyloric stricture from cicatrix of old ulcer	Melancholia. Much pain, vomiting, and wasting	Feb. 6, 1887
32	Lücke	Same as 16. A mere footnote	F.	36	Carcinoma of pylorus	—	March, 1887
33	Postempski	Morgagni, xxx, 1888, pp. 333—336	F.	31	Cancer of pylorus	For 1 year, indigestion, vomiting, wasting. Tumour to be felt	? Aug., 1887
34	Page	—	M.	48	Cancer of pylorus, stomach, and glands	Vomiting, sarcinæ, and wasting	Dec. 21, 1887
35	Lauenstein	C. für Chir., 1888, No. 26, p. 472	F.	65	Cancer of pylorus, with much gland involvement	Indigestion for long; vomiting and wasting for 3 months	Mar. 13, 1888
36	Fritzsche	Brit. Med. Journ., vol. ii, 1888, p. 787; Korrespondenzbl. für Schweizer Aerz., 1888, No. 15; C. für Chir., 1889, No. 2, p. 37	M.	57	Malignant stricture of pylorus	No details	1888

Operation.	Result.	Remarks as to effect of operation or necropsy	Later history.
Median incision. Cancerous piece of peritoneum removed. Direction of gut determined by Nothnagel's experiment	Recovered	No collapse. Trouble from flatulence and diarrhœa, but well enough to leave the hospital in 3 weeks	Died 6 months after at her home.
Median incision. Wölfler's; Nothnagel. A fist-sized tumour extended from the right lobe of the liver backwards towards the spine, having adherent to it the pylorus, the duodenum, and the transverse colon	Recovered	Much collapse and vomiting for 2 days; then rapid improvement, and up on 14th day. Discharged July 11, having gained 10 lbs.	A month later had gained 5 lbs. more; in 11 months still well, and hardly any discomfort.
Wölfler's	Died in 10 days	Did well for 5 days, when violent vomiting came on. Necropsy: union sound No peritonitis	Cause of death due to kinking of the gut, whereby also the bile secreted passed from the duodenum into the stomach by the artificial opening.
Wölfler's	Recovered	Left the hospital in 4 weeks in good general condition	"Es ist dies der Fall, über dessen interessantes chemisches Verhalten Cahn auf dem 6 Congress für innere Medicin berichtete."
Wölfler's. Median incision	Recovered	Did well. No details	—
Median incision. Wölfler's. Barker	Recovered	General comfort and improvement. Almost entire cessation of vomiting, but no gain in weight	Died in 10 weeks and 3 days. Portion of gut sutured 9 inches only from ileo-cæcal valve. Fistula very small.
Median incision. Chose a piece of gut directly under the transverse colon, and tested peristalsis by Nothnagel	Died in 11 days	Copious diarrhœa set in on 3rd day, and unchanged food was passed *per rectum*. Exhaustion. Operation wound had done well	Point sutured was 40 centimetres above the ileo-cæcal valve. The greater part of the small intestine was lying in a cluster and quite empty. Fistula good and sound
—	Recovered	Rapidly well. Secondary suture of abdominal wall necessary, stitches having given way on 10th day	Gained 10 kilogrammes in 3 months, and 7 months after operation was in good health. Sensation of constant hunger and of food passing quickly out of stomach

No.	Surgeon.	Reference.	Sex.	Age.	Disease.	Duration and symptoms.	Date of operation.
37	Fritzsche	Ibid.	F.	37	Simple cicatricial constriction of pylorus	No details	1888
38	Rydygier and Jaworski	Dtsche. med. Wochsch., No. 14, 1889	M.	60	Malignant pyloric growth adherent to liver and stretching on stomach; glands enlarged	One year indigestion, pain, vomiting, loss of flesh; tumour felt	Dec. 21, 1888
39	Ranschoff	Polyclinic, Feb., 1889, and Med. Chronicle, June, 1889, p. 226	M.	37	Cancer of pylorus; nodule in liver	Vomiting persistent and excessive; tumour to be felt	? Dec., 1888
	In addition to these there are two cases in which Pylorectomy was						
40	Billroth	von Hacker's Monograph	M.	48	Malignant stricture of pylorus	For nine months discomfort after food; vomiting for two months; tumour felt for five weeks	Jan. 15, 1885
41	Krönlein	C. für Chir., 1888, No. 40, p. 744	M.	24	Traumatic stricture of pylorus, due (?) to severe blow on pit of stomach in March, 1887	Great local pain and constant vomiting, from time of his fall from horse	Nov. 24, 1887

NOTE.—At the Eighteenth Congress of German Surgeons this year ('Beilage zur
and Lauenstein, of Hamburg, to six and nine cases respectively; but there

Operation.	Result.	Remarks as to effect of operation or necropsy.	Later history.
—	Recovered	In 2 months had gained 10 kilogrammes, and at end of 77 days was perfectly well and able to eat anything	—
Median incision. Wölfler's and Barker	Recovered	Strength and weight slowly but steadily gained, and symptoms relieved. Increased by Feb. 10 from 47·2 kilogrammes to 50·1 kilogrammes	Paper records extensive observations on the capacity of the stomach and the improvement in digestive processes
Median incision. Senn's bone plates used	Recovered	"Temp. rose to 101·5° Fahr., but the patient progressed to convalescence without mishap"	—
performed at the same time as the Gastro-enterostomy, viz.:			
The pulse being very good after suture of stomach and jejunum together, the pyloric growth was removed, the divided ends of stomach and duodenum being then separately closed by suture	Recovered	Rapid convalescence. Discharged in 4 weeks, having gained ¾ kilogr.	Symptoms soon afterwards returned. The disease then made rapid advance, and he died in May. Prolongation of life very doubtful
Resection of pylorus, which was closely adherent to liver. The lumen of this resultant opening being found too small, Krönlein proceeded at once to gastro-enterostomy, it being impossible to resect, because of adhesion, a large enough piece of duodenum	Died next day	Never rallied from collapse	—

Centralblatt für Chirurgie,' 1889, No. 29) reference was made by Augerer, of Munich, are no sufficient details to allow of their being included in the above table.

(For report of the discussion on this paper, see 'Proceedings of the Royal Medical and Chirurgical Society,' Third Series, vol. i, p. 126.)

DESCRIPTION OF PLATES IX AND X.

A Case of Gastro-enterostomy; with a Table of the Cases hitherto recorded (HERBERT W. PAGE, M.C.).

These figures represent in order of number the various steps of the operation, from isolation of the portion of bowel in fig. 2 (Plate IX), approximation and suture of the stomach and intestine in figs. 5 and 6 (Plate IX), figs. 1—5 (Plate X), to the final union by suture in fig. 6 (Plate X).

St. = Stomach.
Int. = Intestine.

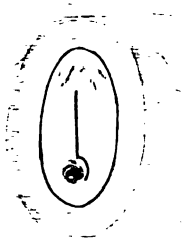


Fig 1

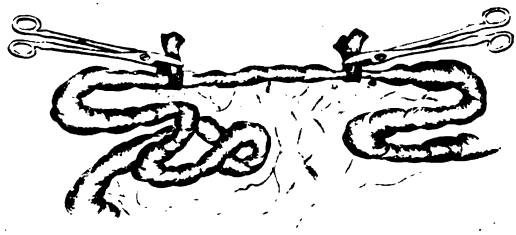


Fig 2

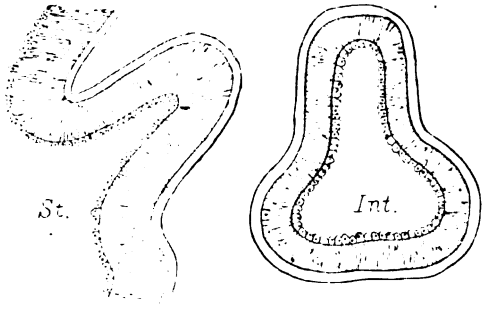


Fig 3

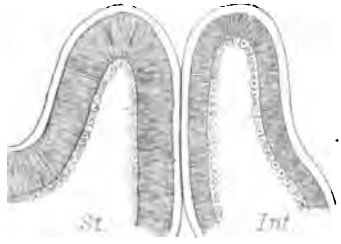


Fig 4.

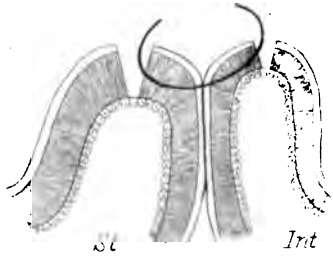


Fig 5.

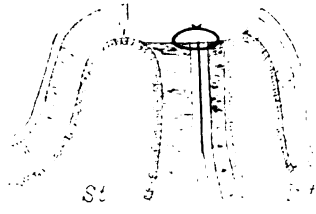


Fig 6

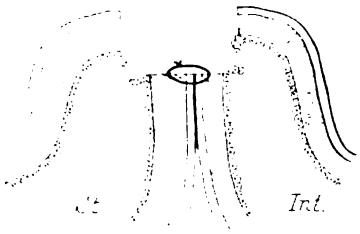


Fig 1.

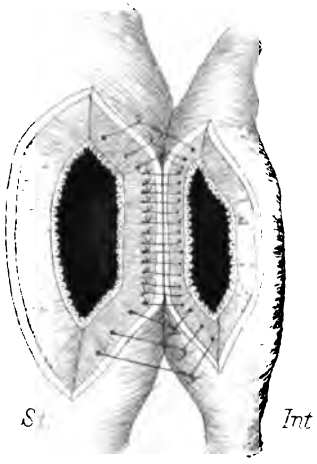


Fig 2.

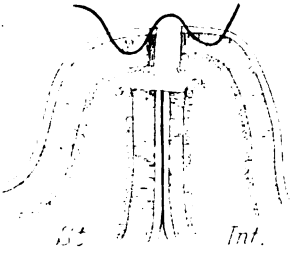


Fig 3.

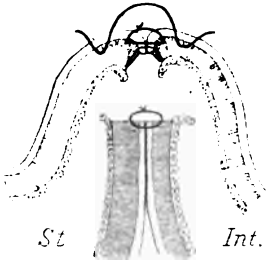


Fig 4.

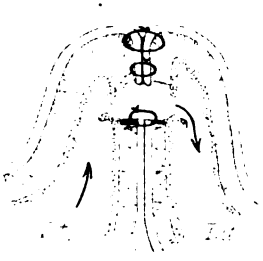


Fig 5.

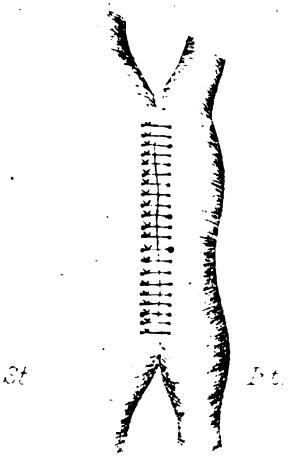


Fig 6.

INFLUENCE OF PHOSPHATE OF SODA

ON THE

EXCRETION OF URIC ACID

AND SOME OF THE CONDITIONS WHICH PREVENT ITS ACTION.

BY

A. HAIG, M.D.

Received March 19th—Read May 28th, 1889.

In a Thesis for the Degree of M.D. (John Bale and Sons, 1888[1]), p. 14, I have drawn attention to the fact that phosphate of soda is a well-known solvent of uric acid and that it increases the excretion of this substance; but further investigation has shown me that while the above statement is practically true for the pure neutral phosphate (Na_2H,PO_4), it does not necessarily apply to all specimens of phosphate sold as Sodii Phosphas, B. P.

After writing the above Thesis I was led by my results with the phosphate to recommend its use in a case of gout, the notes of which have been published in 'St. Bartholomew's Hospital Reports' for 1888, p. 217.

But I found to my surprise that it not only did no good in this case but actually precipitated an attack of gout;

[1] And 'British Medical Journal,' July 7th, 1888.

several specimens of the salt from different sources having the same effect.

And examination of the urine showed that it caused no plus excretion of uric acid, but on the contrary retention, the retention coinciding with the attacks of gout which were obviously due to it.

I then tried these various specimens of phosphate on myself, and as they gave results which were very different from those I had previously obtained with phosphate of soda, I concluded that there must be some chemical difference between the various specimens. I therefore got them analysed, and I now give some of the results obtained in Messrs. Savory and Moore's laboratory by Mr. J. E. Saul, F.I.C.

Percentage of sulphate occurring in disodic phosphate. The contamination is calculated as dry disodic sulphate, and the percentage is taken on the anhydrous phosphate:

No. 1. Recrystallised) 1·2 per cent.
No. 2. (Recrystallised) 1·9 per cent.
No. 3. Recrystallised) 2·8 per cent.[1]
No. 4. Commercial) 6·8 per cent.

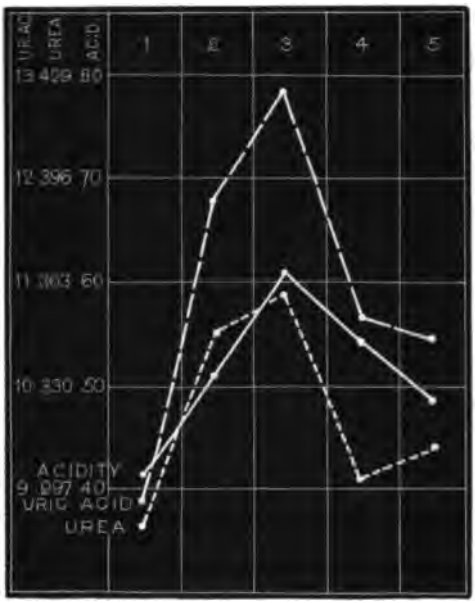
From this it will be seen that all the specimens contained as an impurity a certain small percentage of sulphate, varying from 6·8 in the commercial to 1·2 in a specimen of the recrystallised salt. One specimen not given in Mr. Saul's Table contained even less than 1·2 per cent., and by great good fortune I had obtained and used some of this in my first experiments with phosphate of soda.

Having found in this way that the contamination with sulphate was probably of great importance with reference to the action of the phosphate on uric acid, I asked Messrs. Savory and Moore to try and obtain for me an absolutely

[1] No. 3 in Mr. Saul's Table was the salt first used in the case of gout at St. Bartholomew's.

pure phosphate of soda. They found, however, that recrystallization even many times repeated did not suffice to remove all trace of sulphate from the commercial phosphate, and they therefore prepared for me a pure phosphate by the careful combination of sodium hydrate and phosphoric acid.

FIG. 1.

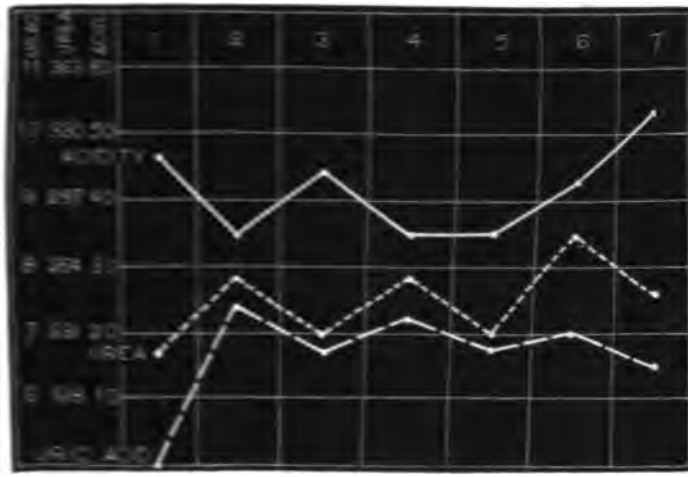


Having in this way obtained a pure salt, I proceeded to experiment on myself with it, and I found that, with a few exceptions, the causes of which I shall go into further on, it might be relied on to cause a plus excretion of uric acid, and I have given in Fig. 1 the results obtained by taking one drachm of the pure salt three times a day for five days.

It will there be seen that the uric acid is only slightly above the urea on the first day, but rises higher above it on the second and third, and remains above it as long as the salt is taken; and this is the same result as I had

previously obtained with phosphate of soda and mentioned in my Thesis. The rise of urea and part of the rise of acidity on the second and third days are due to meat and wine taken on the second day; part of the rise of acidity is due to the phosphoric acid, or acid phosphate of soda, and is constantly seen when the phosphate is taken (see previous reference to Thesis).

FIG. 2.



I then proceeded to combine the pure phosphate with a known amount of sulphate, viz. ten grains of sulphate to each drachm of phosphate, corresponding roughly to about 15 per cent. of sulphate, and I have given in Fig. 2, the results obtained with this mixture of phosphate and sulphate, and also with the sulphate taken alone. It will be seen that the uric acid is below the urea every day in this observation, and that the phosphate when combined with the sulphate did not cause a plus excretion of uric acid.

Moreover, a reference to my notes shows that on these days when the mixed salts were taken, there were very marked pricking and shooting pains in the joints and muscles, so that the clinical signs of uric acid retention were present.

I have said in the paper on gout in 'St. Bartholomew's Hospital Reports,' previously referred to, p. 224, that the bad results obtained were due to the impurity of sulphate in the specimen of phosphate used; but I think that it is now possible to go further and to say that while the pure neutral phosphate of soda (Na_2HPO_4) is a good solvent of uric acid and causes a plus excretion of that substance; yet if the phosphate meets with any acid when in solution, such acid may by combining with part of its alkali reduce some of it to the condition of an acid phosphate and destroy its power of producing a plus excretion of uric acid.

And in accordance with this I have found that there is no plus excretion of uric acid with the pure phosphate when a little dilute phosphoric acid has been added to its solution, and, on the other hand, when a little bicarbonate of soda has been added the plus excretion is very marked.

I have also found that some specimens of the pure phosphate act better and more certainly than others, and that those specimens act best which contain most of the pure Na_2HPO_4, while other specimens, apparently in the process of crystallization, get mixed with a certain amount of acid phosphate (NaH_2PO_4) and cause little or no plus excretion of uric acid.

I have been told by Mr. Saul that when a solution of Na_2HPO_4 having an alkaline reaction is set aside to crystallize it may come to have an acid reaction during the process, and I think that then possibly some of the phosphate may be crystallized as NaH_2PO_4 rather than as Na_2HPO_4, and when any specimen contains much of NaH_2PO_4 it fails to act well on the uric acid. When the phosphate is mixed with sulphate it has a harsh bitter taste in the mouth, and is very liable to cause some intestinal pain and irritation, with some relaxation of the bowels: the pure Na_2HPO_4 has a bland and pleasant taste, and has but little tendency to affect the intestines.

The point to be attended to in practice then is to obtain a pure neutral phosphate of soda (Na_2HPO_4) which is not only free from sulphate, but free from any considerable

admixture with the acid phosphate (NaH_2PO_4); and it should not be given along with acids, but rather with the addition of a little bicarbonate of soda, such as ten grains of the latter to one drachm of phosphate.

If we can obtain such a salt we have a substance which is pleasant to take, and has, so far as I know, no bad effects either on the intestines or the kidneys; and yet, if the ingestion and formation of acids can be kept within moderate limits, it insures a free daily excretion of uric acid so long as it is taken. Since it causes such free excretion of uric acid it is almost certain to be useful in diseases which take origin in the retention and accumulation of uric acid, and about its action in some of these I shall now say a few words.

It is not likely to be very useful in acute gout because high and rising acidity is so marked a factor, indeed, the actual cause of this disease, and high acidity may, as we have seen, overcome and prevent the solvent action of phosphate of soda on uric acid.

This is an important point, for it shows up in marked contrast the action of phosphate of soda and salicylate of soda; acids may overpower the phosphate, while the influence of the salicylate is, as I have pointed out in 'Med.-Chir. Trans.,' vol. lxxi, p. 131, actually assisted and increased by a high and rising acidity; and in my experience salicylate of soda is very useful in acute gout, while the phosphate is of much more doubtful value.

In mental depression, however, in so far as this condition is dependent on uric acid ('Practitioner,' November, 1888), I believe that the phosphate may be able to turn the tables on the salicylate, for mental depression generally coincides with a low and falling acidity, that is, with a plus excretion of uric acid under alkali. This condition favours, as we have seen, the complete excretive action of the phosphate, and further, this salt while providing for the free excretion of uric acid slightly raises the acidity and produces feelings of brightness and well-being.

In my own experience there is no drug which causes

such steady and continuous feelings of mental brightness and well-being as the pure phosphate of soda. To obtain this result I have not found it necessary to go beyond the dose of one drachm of the salt to be taken in a tumbler of hot water every night at bed time, and I have been able to continue this for weeks and months without any bad effect. So far as my experience goes the same result can be obtained in others. The same will hold, also, good for the uric acid headache, which presents all the conditions of mental depression only in greater intensity ('Med.-Chir. Trans.,' vol. lxx, and 'St. Bartholomew's Hospital Reports,' vol. xxiii).

With regard to headache phosphate of soda has one effect in common with salicylate, viz. that the plus excretion of uric acid occurring under either of them is not accompanied by any headache, or by any feelings of mental depression as it is when it occurs under the influence of an alkali alone; and this fact is, I think, a sufficient answer to anyone who would be inclined to ask, Why give the phosphate of soda to increase the excretion of uric acid rather than the bicarbonate of soda?

By all means let those who do not suffer from headache, and who do not fear a little mental depression, take the bicarbonate if they prefer it; but the phosphate is no foreign substance to be kept out and avoided, it is, on the contrary, a natural constituent of the tissues and fluids of the body, and probably one of the natural solvents of uric acid in the system (See 'Med.-Chir. Trans.,' vol. lxxi, p. 288).

There are other conditions connected with uric acid in which my experience with the phosphate is not sufficient to allow of my saying much at present, beyond the general statement of its probable utility.

My object, however, in this paper is to point out again that phosphate of soda is useful in some uric acid diseases, and now more especially that it may be used with advantage in some cases where the powerful action of salicylate of soda is not absolutely necessary.

The salicylate is a powerful excretant of uric acid, and its chief importance depends on the fact that acids increase rather than diminish its activity; on the other hand, it has undoubted toxic properties which are more or less manifest in every case where large doses are given; it often, even in ordinary doses, causes gastric irritation and nausea; and it is not free from the suspicion of causing albuminuria, delirium, and other troubles.

The phosphate is a less powerful excretant of uric acid, and the mineral acids or their salts may more or less interfere with its action; but when its power is sufficient it has the advantages of being a natural constituent of the tissues and fluids of the body, of having no toxic properties, and of causing little or no irritation in the stomach or intestines; and last, but not least, its taste is bland and by no means unpleasant.

Note.—The present price of the pure phosphate as made by the combination of sodium hydrate and phosphoric acid, is relatively high (viz. 6*d.* per oz., or in quantities of 50 lbs., 4*s.* per lb., or of 112 lbs., 3*s.* per lb.), but no doubt this would soon be reduced if it were used to any large extent.

(For report of the discussion on this paper, see 'Proceedings of the Royal Medical and Chirurgical Society,' Third Series, vol. i, p. 131.)

THE RESUSCITATION OF THE APPARENTLY DROWNED.

BY

R. L. BOWLES, M.D., F.R.C.P.

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THE resuscitation of the apparently drowned has, on several occasions, been discussed by this Society, and much real work was done by its Committee in 1862 to clear up doubtful points and to afford a settled basis for the management and judicious treatment of apnœa and drowning.

Since, however, the issue of the very valuable Report, published in the 'Transactions,' new methods of treatment have been promulgated and new experiences on the management of cases allied to drowning have arisen, which must influence very materially any views we may formerly have entertained.

These proposed new methods have aroused doubts in the minds, not only of the public, but of the profession, as to which method should be adopted in any given case: such doubts are fatal to effective action and should at once be dispelled.

The knowledge of the treatment of the apparently drowned must not be confined like other medical treatment

to the medical profession: it is essential to the commonwealth that its details should be clearly laid before the public in as simple a form as possible, and that this should be done by an authority in our profession, such as this Society possesses. The Royal Humane Society, the National Lifeboat Society, and local authorities generally, would gladly avail themselves of our proffered assistance and advice, and would arrange to have their officials trained to treat cases of drowning instantly, on the spot, whilst a medical man was being sent for, if only they had the support of a proper authority. The doctor can never be in time unless he happens to be present when the accident occurs.

That the public recognises this, and very much appreciates our advice and assistance, is proved by the following note which was added to the instructions of the Royal Humane Society: "The above directions are chiefly Dr. H. K. Sylvester's method of restoring the apparently drowned, and have been approved by the Royal Medical and Chirurgical Society."

Now I felt at the time that our Society was premature in giving its imprimatur to Dr. Sylvester's method of treatment, as his method was opposed to the principles indicated by the experiments performed by our own Committee. The Committee showed "that in drowned animals not only were all the air passages choked with frothy fluid more or less bloody, but that both lungs were highly gorged with blood, so that they were heavy, dark-coloured, and pitted on pressure, and on being cut exuded an abundance of blood-tinged fluid with many air-bubbles in it." I quote this from remarks made at the time on the experiments, by Dr. C. J. B. Williams[1] the distinguished chairman of the Committee. Here we have positive evidence of the lungs being already full of fluid; further, that this fluid had been introduced with very great force, sufficient to raise a column of mercury four inches, and further still, that at each expiration, as air was expelled, water took its place

[1] 'Lancet,' July 12th, 1862.

with the next inspiration. The Committee up to this point made a distinct advance; it settled an important point of pathology in a clear and definite manner. Before this time, although Sir John Simon and a few other pathologists asserted the *presence of water in the lungs* in cases of drowning, the opinion of Sir Benjamin Brodie prevailed both in the profession and at the Royal Humane Society, to which the public always turns for advice in this matter: Sir Benjamin says in his work on 'Pathology,' p. 88, "That the admission of water into the lungs is prevented by a spasm of the muscles of the glottis cannot, however, be doubted, since we are unable to account for the exclusion of it in any other manner; and a multitude of circumstances prove that these muscles form a sphincter to the windpipe as perfect in its functions as any sphincter in the body." The Committee showed by their experiment that Sir Benjamin Brodie's theory of the non-existence of water in the lungs was incorrect—for they proved that water *did* exist.

Now instead of showing how this water, of which they admit the lungs to be full, could be first removed and then replaced, *pari passu*, by the introduction of pure air, the Committee advised the adoption of a method which would introduce the largest amount of air into *empty* lungs. I would ask how it was to be introduced into lungs shown to be already full of water? The only effect of forcibly driving in air, which the Sylvester method certainly does, would be to drive the water forcibly forward into the minute bronchial tubes, and into the air-cells, giving rise to a spongy or doughy feeling instead of the natural light elastic crepitation of healthy lung tissue. Moreover, the water becomes inspissated with mucus, and frothy, by mingling with the air remaining in the lung: an exaggerated condition of what I have formerly shown produces, in apoplexy, "mucous stertor."

It must have surprised the Committee to have found their results, although confined to animals, so entirely opposed to those of Sir Benjamin Brodie, and caused them

to wonder how such differences could have arisen. It occurs to me that Sir Benjamin, and others at that time, must have drawn their conclusions from the fact that at times, in drowning, no water was found in the trachea and larger air-tubes: this, however, could not be so surprising when we reflect how easily water will make its way out of the trachea and large tubes during the many and irregular movements to which the body is subjected whilst being removed from the water to a suitable place for treatment, and further, when we reflect how rapidly water evaporates on exposure to the air. At all events, it is now quite certain, thanks to this Society, that the previous observers were in error. In 1862 I had a case of drowning, and observed it very carefully during the whole course of its treatment. I made it, in fact, the subject of an experiment, and I found that for three quarters of an hour a little fine white foam was expelled from the mouth or nostrils at each pronation of the body. A second case soon followed, and my observation of it gave precisely similar results. I then critically examined the many cases of drowning reported by Professor Casper, and in nearly all of them was to be found most positive evidence that the lungs of the apparently drowned were gorged with water. He says in the following extracts (vol. ii, p. 238, *et seq.*):

"In the recent bodies of those who have been suffocated by drowning we find, besides the cinnabar-red, vascular injection of the tracheal mucous membrane, sometimes only a few isolated, white, but very distinct, small, pearl-like bubbles; sometimes a much greater quantity of froth, which is generally white, and more rarely bloody, and sometimes the whole tracheal canal is completely filled with this finely vesicular white foam. This extends into the bronchi, or rather, extends out from them and their ramifications, as is distinctly evinced by exerting strong pressure on the as yet untouched lungs, when this froth will be seen to ascend into the opened trachea, even in those cases in which little or none of it had been originally found." . . . . "I have found this appearance in the trachea" (in those

entirely submerged from the first), "precisely the same as in those other cases in which a repeated emergence above the surface of the water, though not positively known, might yet have been supposed to have taken place. At all events, since this froth is the product of the mixture of the inhaled fluid, in which the drowning has occurred, of the natural mucus of the passages, or even of blood from some ruptured vessel with the air contained in the lungs and trachea, and caused by the final forcible respiratory movements, it must be regarded as an indubitable sign of vital reaction—that is, that life must be regarded as having existed at the period of its formation." . . . . The lungs completely distend the chest, "they appear to be inflated like a balloon, and are not like ordinary healthy lungs, tolerably firm and crepitating, but feel exactly like a sponge. A similiar condition is not found so constantly after any other kind of death, excepting only the most acute œdema of the lungs, which, however, is not present in this case, and, occasionally, after suffocation in irrespirable gases. The distension of the lungs is in part an actual hyperæria, in consequence of the most violent inspiratory acts carried on at the momentary emergences of the head of the drowning person above the surface of the water, but partly and chiefly a consequence of the inhalation of the fluid, in which drowning occurred, into the lungs, as has been indubitably proved by experimenting on animals with coloured fluids, and by my own experience in regard to specific fluids. When the lungs are incised there is a copious outflow of sero-sanguinolent froth. Though, in the controversial writings regarding death from drowning, it has been maintained on the one hand, on the ground of experiments on animals (by Daniel, Morgagni, de Haen, Metzger, Orfila, &c.), and controverted on the other, on the same ground (by Goodwyn, Haller, Maier, Wistrand, Albert, &c.), that water can also get into the air-passages after death, or finally, that it can only then be introduced by means of artificial contrivances (Löffler, Riedel, Kanzler); yet there is a criterion which makes this controversy only interesting in a scientific point of view, and

of no importance practically; I mean the *frothy* condition of the fluid found in the lungs and throughout the air-passages, which, under no conditions can be produced in the dead body, not even by artificial means, as injections, &c., since it (the froth) is the product of the forcible respiratory struggles of the individual while dying.

"The fact, proved by experiment beyond the possibility of a doubt, that the increased volume of the lungs does not exclusively depend upon mere hyperæmia, explains why this condition of the lungs is found even in those cases of drowning where death has been caused, not by asphyxia, but by neuroparalysis, and this adds very much to the value of this most important appearance."

I attach much importance to the work of scientific observers who have devoted themselves to the study of forensic medicine, for they always work with the consciousness of great responsibility and of their statements being subjected to stringent criticism and cross-examination.

We have, then, arrived at this position:

1st. It has been demonstrated by the Committee that water always is present in animals that have been drowned.

2nd. I have adduced living cases, and Prof. Casper has shown in the dead that the same conditions obtain in man under similar circumstances.

3rd. I and others had observed and recorded cases in man in which water had continued oozing away from the lungs for a long period during the application of the Marshall Hall method.

The second part of the Committee's Report now comes under consideration. The application of reflex stimulants to the surface and to the nasal mucous membrane was found to be practically useless for general adoption. Artificial respiration naturally comes next, and the two rival methods, the Marshall Hall and Sylvester, were fairly tested by experiment. It was found that the amount of air introduced into healthy lungs was quite double as much by the Sylvester as by the Marshall Hall method, and it was on that ground that the Committee recommended, "In the

absence of natural respiration, artificial respiration, by Dr. Sylvester's method should be forthwith employed" ('Lancet' July 12th, 1862, p. 38).

Dr. Champneys, in his able researches on 'The Respiration of Stillborn Children,' also found that more air was introduced by the Sylvester than by the Marshall Hall method, and I had, long ago, in the early days of my practice, acquired good reasons for considering the latter method absolutely useless in the treatment of the still-born; but I pass on to the subject more immediately under consideration.

In the case of drowning it was recommended, by the Committee, in addition to "place the body with the face downwards, and hanging over the edge of a table, shutter, or board raised to an angle of about thirty degrees, so that the head may be lower than the feet. Open the mouth and draw the tongue forward. Keep the body in this posture for a *few seconds*, or a little longer if fluid escapes. The escape of fluid may be assisted by pressing once or twice on the back." I forbear for brevity's sake entering into a discussion on the differences between the amount of air introduced by us in our experiments for Dr. Marshall Hall and the experiments of the Committee; and I admit without question that much more air may be introduced by the Sylvester method than by the Marshall Hall method; but I wish now to adduce reasons and experiments to show that not only is the Sylvester method, as above recommended, useless, but that it is even pernicious in cases of drowning; and, moreover, that it is not always applicable even to cases of apnœa generally.

I take up the general subject at a point, in fact, where the Committee ended its labours. In the discussion on the Report, Dr. Edward Smith pointed out that not "any of their inquiries were applicable to the *drowned human subject*," and contended "that the report was but the commencement of the inquiry," and although he recommended a continuance of the inquiry of the Committee, he considered that the solution of the undetermined questions

would be best effected by the patient investigation of individuals."[1]

The cases I would now shortly reproduce are contained in my second paper to this Society (1870), but as they are typical of cases of drowning in the human being, rather than of animals, and as they extremely well illustrate the main features which indicate the relative utility of the Sylvester or Marshall Hall methods of resuscitation, I must be excused for again referring to them.

In 1861, a woman who had been taken out of the Serpentine and treated by the hot bath at the Receiving House, was brought to St. George's Hospital about one hour afterwards. Mr. Jones, the resident medical officer, states that on admission, "her breathing was fair, with loud rattling noise; her lips were livid, her pulse *very good*, her surface and extremities very cold; she was sensible and able to speak." Warmth and appropriate measures were employed, but in half an hour Mr. Jones was suddenly summoned, and only arrived to see her draw her last breath. The Marshall Hall method was immediately employed for half an hour, without the slightest signs of recovery, *but a large quantity of frothy fluid* came from the mouth. At the post-mortem examination next day, it was reported that "both lungs contained an immense quantity of frothy fluid, the bronchi were filled with fluid and injected." In this case the lungs were loaded with and paralysed by water. There cannot be a doubt that the Marshall Hall method would have unloaded the lungs, but I cannot doubt, also, that had she been placed on one side on her arrival at the hospital the upper lung would have cleared and acted quite sufficiently to sustain life. A lung containing frothy fluid does not clear immediately; the bells of foam must gradually coalesce and ooze slowly away, and to assist this, nothing is more adapted than the Marshall Hall method.

Dr. Trollope, of St. Leonards-on-Sea, was called to a man who had been taken out of the sea. The man could

[1] 'Lancet,' July 12th, 1862, p. 39.

speak a little, and vomited a quantity of water; but he rapidly became worse, insensibility came on, the breathing was slow and faint, and the pulse flickering.

The Sylvester method was being used, and Dr. Trollope persisted in it for some few minntes. "Meanwhile," Dr. Trollope reports, "his respiration had ceased, beyond a slight mucous rattle in the windpipe; his heart's action could not be felt; jaw clenched, and lips livid. . . . . I then, finding these alarming symptoms supervening in spite of the persistence in Dr. Sylvester's method, immediately had recourse to Dr. Marshall Hall's prone and postural, or 'ready' method, and was gratified to find *fluid escape from the mouth each time the body was laid on the chest,* and respiration gradually set up, commencing with long-drawn respirations, or rather gaspings, at intervals. I persevered in the prone and postural movements for three-quarters of an hour, till respiration was thoroughly and satisfactorily established. The man then again vomited between a pint and a quart of water, and was afterwards able to swallow a few tablespoonfuls of tea, and went on satisfactorily."

In March, 1862, I was called to a man who had been knocked into the sea by a heavy chain. It was calculated that he had been under water three minutes. On getting him ashore he was believed to be dead, but one of the men thought "they ought to get the water out of him," and so proceeded to roll him from side to side, and whilst this was done, a quantity of water was expelled from the mouth, and they perceived some attempt at breathing.

A few minutes after this I was on the spot, and found the man apparently dying, making occasional and feeble attempts to breathe, with a very feeble and irregular pulse. He was lying on his side with his head upon a coat, and a quantity of froth tinged with blood lying on the coat in the neighbourhood of his mouth. I observed that clear water and froth welled out of his mouth at the end of every inspiration. Active friction of the limbs, hot bottles and bricks, were carefully applied, and ammonia to the nostrils.

Nearly an hour elapsed before we thought it possible he could live. He then began to moan, and in a short time a small quantity of brandy was swallowed.

In July, 1864, a man was capsized in a boat at sea. After being in the water some time he was picked up and rowed ashore. On arrival he was cold and livid, but breathing with great labour. He was immediately turned on his side by the coastguardsmen, and a quantity of frothy fluid came from the mouth. He was taken to an inn, where he was kept on his side, and where I saw him a quarter of an hour afterwards. He was then breathing with difficulty. A fine white froth, almost like milk, was oozing from his mouth and nose; his face was very livid, and meaningless in expression; his breath was cold; the limbs and body generally were almost stone cold; the pulse could not be felt. There were a few moist râles in the left side of the chest, the side which was uppermost, but the breathing was tolerably free; the breathing on the side upon which he lay was very feeble and obscure, and moist râles more abundant. He could not be roused. In half an hour he became a little restless, and then vomited a quantity of water. The pulse could now be felt, but not counted; this gradually improved. Attempts at vomiting supervened, and occasionally a partial restoration to consciousness. After another attack of vomiting, the pupils which had been widely dilated, became contracted, and he went off into a sound sleep. He passed a most trying night from restlessness, and pain at the epigastrium; and the next day he was still livid, but better and easier. The following day pleuropneumonia of the right side (that which was downwards) supervened. From this he slowly recovered.

The following extract from a letter from Dr. Colbeck, of Dover, are corroborative and worth relating:

"Some years ago I had a case of drowning at the Sailors' Home in which I distinctly made out water to be present in the lungs, as there were loud mucous râles throughout both lungs; after long and persevering efforts with the Marshall Hall method, I succeeded in resuscitating the

man. During the whole period some water flowed from the mouth, much of it doubtless from the lungs as it was very frothy. He had a severe attack of broncho-pneumonia subsequently and was very ill, but from this he also finally recovered."

On August 11th, 1871, I was summoned to a case of drowning. I found a young man about nineteen years of age lying on his back on the beach and men engaged rubbing his limbs.

The face was livid and there was froth about the mouth and nostrils, the eyes were open, conjunctivæ congested and pupils dilated and fixed; there was no pulse, no respiration, nor other sign of life. On percussion both sides of the chest were dull but less so in the subclavian regions.

The patient was turned on his face and a quantity of clear water and froth issued from the mouth and nostrils; he was then turned on his side and the Marshall Hall method continued steadily for three quarters of an hour; up to the last a little froth issued from the nostrils when pressure was applied to the spine in the prone position. From time to time I examined the chest, and found the upper (right) lung gradually clear until at last it gave forth quite a natural resonant sound on percussion, whereas the lower lung remained perfectly dull.

After using the Marshall Hall method for ten minutes, when I thought most of the water had come from the upper lung, I had the upper arm (for the patient was kept on one side, the left, the whole time) raised up over the head, in the manner described by Dr. Sylvester; more air now appeared to enter the tubes, and froth was, on compression of the thorax when the body was pronated, expelled. I could hear râles in the chest during the artificial respiratory movements. The face became less livid, and this was the only apparent change which occurred during our efforts. The temperature of the body was sufficiently preserved by the heat of the sun. I had no galvanic apparatus at hand. On careful inquiry there is no doubt that the patient had been under water for twenty minutes, for he was bathing

half a mile from the town, and this distance had to be traversed and a boat rowed to the spot before assistance could be afforded. He was found near the bottom face downwards, in a sort of stooping position, and rose readily to the surface when an arm was placed beneath the body.

This case, although unfortunately unsuccessful in its results, was most valuable as an experiment; like others I have seen before, it affords proof that water *does* enter the chest, and that before air can be introduced the water must be removed; for this purpose, no method hitherto suggested can equal the Marshall Hall method as it is both simple and certain to effect its object. Moreover, it proves that the application of the Marshall Hall method, for from two to five minutes as proposed by the Committee of the Royal Medical and Chirurgical Society, will not suffice to clear the lungs.

Stretching the pectoral muscles by raising the shoulder undoubtedly increases the respiratory action, but in issuing rules to the public I think it better omitted, for it tends to confusion; whereas it is impossible for anyone to misunderstand the simple instructions of the Marshall Hall method.

The general press now almost daily records cases of death by drowning in which because the *appearance* of death is present, its reality is assumed and no intelligent efforts at resuscitation are employed, although in many instances the bathers have only been missed for a very few minutes. I would suggest that the profession should press upon the municipal authorities the urgent necessity of having a good boatman in the neighbourhood of bathers. He should be well instructed (drilled from time to time) in the Marshall Hall method, so that when the medical man arrives he will find the most important preliminary steps have already been taken, and perhaps the life already saved. In the case I have now recorded the boatman rowed the body along shore for half a mile and did nothing, instead of at once going ashore and commencing the work of resuscitation.

A case almost identical with the foregoing was under the joint care of Dr. Tyson and myself. The young man, aged twenty, had been in the sea submerged for about the same time, the appearances were similar, a similar treatment was adopted, similar changes took place in the lungs during the treatment, and the froth continued to ooze from the mouth about the same length of time. Both cases were carefully observed, and might be fairly looked upon as experimental and scientifically accurate.

The following case has been kindly supplied to me by Dr. Tyson:

A man, aged about forty, was brought into the Folkestone Hospital. He had fallen into the harbour, and was believed to have been in the water from ten to fifteen minutes. On admission he was very cold and in a collapsed condition. There were feeble attempts at respiration. The Marshall Hall method was immediately applied, and continued for thirty minutes.

During its employment the man was always kept on one side, and was turned from face to side from sixteen to twenty times in the minute. Sea water of a frothy character escaped from the mouth during each expiratory action for twenty minutes or longer. The man was manifestly better for the treatment adopted, but it was not considered safe to discontinue the artificial respiration for at least half an hour. The man eventually made a good recovery.

These examples show very conclusively that in cases of drowning in man, water *does* exist in the lungs; that the water only very gradually, and after a long time, is effectually expelled; and that it is absolutely impossible that any relief should be afforded in this way by the Sylvester method.

In 1863 I advanced another step, and in an experiment on a patient suffering from mucous stertor demonstrated that it was dangerous to change the position of the patient from one side to the other, as recommended by Dr. Marshall Hall; for, after the patient has been lying on one side for

a time, the mucus and fluids gravitate into the lowermost lung, and upon the patient being rolled over on to the other side, the mucous fluid found its way across the trachea to the opposite lung, but in doing so, it had been whipped into foam with the ingoing air, which foam, by filling up the larger bronchial tubes, quickly caused suffocation of gradually increasing intensity.

Other cases soon after occurred in which I was able by experiment and by examination of the chest during life to confirm the above observation, especially in a case of active hæmoptysis in which blood took the place of mucus.

Of course water, slightly inspissated with mucus, would necessarily follow the same course in changing the side, and this I have fully proved *does* take place in cases of drowning.

Further, in one case in which I did *not* allow the side to be changed, pleuro-pneumonia supervened on that side *only* which had been lowermost. The change of side therefore which Dr. Marshall Hall had originally advised to be adopted during the use of his method must on these grounds, in future, be carefully guarded against.

I had become entirely convinced that the prono-lateral positions were the only positions to be depended upon in the management of these cases, and that the removal of the tongue and epiglottis from positions of danger was a part of such management. The advice given by the Committee in 1862 "to open the mouth and to draw the tongue forward" again raised the question of the possibility of treating cases in the supine position. I would quote the following account of three experiments in the supine position in which some obstruction was encountered in attempting artificial respiration on the dead subject, and I quote as well, the account of the dissection made by me at the time to ascertain the cause of the obstruction (Marshall Hall 'On Drowning' 1857, pp. 65 and 66).

"A middle-aged man, very much emaciated, having suffered for a long time from abscess of the brain; rigor mortis still present; the brain had been removed.

"*Experiment* 1.—Alternate pressure and relaxation on the thorax, the body supine; no effect.

"*Experiment* 2.—On pronation about one third of the tube —on applying pressure, nearly the whole tube—was filled; on removing the pressure, the tube was emptied to one third; and on resuming the lateral position it was quite emptied. These movements were several times repeated, and invariably with the like series of results.

"*Experiment* 3.—Experiment 1 was repeated. No effect was at first produced; but on pressure being applied by a *sudden jerk*, some obstacle seemed to be removed, and expiration was the result, to such a degree that the tube was nearly filled, as in Experiment 2, and on removing the pressure the corresponding amount was inspired. After this, alternate pressure and relaxation, in the supine position, produced inspiration and expiration with ease. On removing the tube no obstacle was to be seen in the pharynx.

"*Remarks.*—Experiment 1 proves that in the supine position *something* does at times prevent respiration in the dead subject; and although in Experiment 3 respiration was produced in this position it could not be done at the commencement; some obstacle had first to be overcome, probably adhesion of the epiglottis to the back of the pharynx by viscid mucus, as the following observation would tend to prove.

"On cutting down and removing the right side of the pharynx with corresponding halves of the hyoid bone and thyroid cartilage, in another subject, a tolerable view of the position of the parts was obtained. The epiglottis was in direct apposition, by its laryngeal surface, with the posterior wall of the pharynx, so as to preclude the possibility of the passage of air. When, however, the head was allowed to hang backwards over the edge of the table, the bending of the cervical vertebræ caused the posterior wall of the pharynx to recede from the epiglottis, so as to allow the free passage of air. If the tongue had been drawn forwards, would the epiglottis have been removed from the

pharynx? or would the prone position cause it to fall forwards?"

It will be seen by this, and especially by the question asked at the end, that I at that time doubted the propriety of trusting to the pulling forward of the tongue as a remedy.

In my paper on Stertor ('Med.-Chir. Trans.,' 1860) is another dissection of the pharynx, which besides "demonstrating the respective positions of the tongue with the opened and closed mouth, suggest the necessity of caution being used in raising the head with pillows; for if the head be too much bent forward on the chest, the tongue may lie in dangerous proximity to the pharynx, even if the mouth be closed." This observation applied to the lateral position in a minor degree, but more especially to the *recumbent* position; and I never fail to adopt in practice the teachings to be derived from these dissections. I further made sure by experimenting on myself that dragging on the tongue's tip would not affect its base or the epiglottis sufficiently to make it a trustworthy procedure, so that, as before, I was driven to conclude that nothing could be ever safely trusted as a remedy whilst the patient was supine.

In 1873 Dr. Benjamin Howard, of New York, presented an Essay to the National Lifeboat Institution; in it he says, "The foundation of all true progress in the art of resuscitation was first well and truly laid by Marshall Hall."[1] Dr. Howard had employed and taught both the Marshall Hall and Sylvester methods, but in trying to obviate some defects which he found in them, he took a new line of departure and advocated the employment of what he named the "Direct Method." He claimed for it greater exchange of air, greater facility and ease of application, and greater facility for the drainage of obstructive fluids, and that it is more easy to be understood.

You all doubtless know that this method consists mainly of pressure on the lower ribs, in the supine position, the chest being elevated by a roll of clothing underneath the back,

[1] 'Lifeboat,' Feb. 1st, 1873, p. 381.

so that the chest is on a plane inclined towards the head, which is now at a lower level. It seems that at this time Dr. Howard was not aware that the drawing out of the tongue was not to be depended upon for elevating its base or the epiglottis, for he says, "If there be another person present, let him with a piece of dry cloth hold the tip of the tongue out of one corner of the mouth."[1]

In a paper in the 'Proceedings of the Royal Medical and Chirurgical Society' of May 14th, 1878, he gave "the results of various and repeated examinations and experiments," and said, "The facts to be represented confirm the alleged respiratory obstruction from the tongue, epiglottis, and velum palati in apparent death, in the ordinary supine position, and show how such obstruction is promoted by the customary flexion of the head and neck; that traction on the tongue, however firm, may open the pharynx its retreat had closed, but nothing more, the epiglottis remaining unlifted."

Dr. Howard made, as he said, "a thorough investigation of the whole subject," and proclaimed and again impressed upon the public mind principles previously contended for, and demonstrated by Dr. Marshall Hall, through work carried out by us in the post-mortem room of St. George's Hospital in 1856, and carried on and elaborated by me soon afterwards in my various papers on Stertor, Drowning, and the Apoplectic Condition.

Dr. Howard soon proceeded to apply these principles to his own method, to perfect it, and in the 'British Medical Journal' of June, 1881, we find a paper on "The Direct Method of Artificial Respiration for the Treatment of the Drowned." He says, "Having myself corroborated, both by experiments and in practice, the conclusions of the first Resuscitation Committee of the Royal Medical and Chirurgical Society respecting the swallowing and inspiration of water, either the one or the other, or both, according to certain conditions of the submersion, the direct method, in contrast to the method curiously enough recommended

[1] 'Lifeboat,' Feb. 1st, 1873, Rule 3, p. 382.

by that same Committee, begins by emptying the water-logged thorax, relieving the distended stomach, releasing the otherwise immovable diaphragm, and thus making an inspiration possible."

He pointed out how hopelessly useless were the attempts to follow the instructions of the Royal Humane Society, which provided no practical way of dealing with the many obstructions that may, and do more or less, occur in every case of drowning, apnœa, or syncope, and contrasts with those instructions his own, as he believed, more excellent way.

He has shown clearly enough that no doubt should now remain in the professional mind as to the existence of obstructions in the pharynx, and that they must be removed, and the effectual drainage of the lungs provided for as the first step in the treatment of the apparently drowned. To me, of course, every word he said was at once clear and undeniable, because he exemplified and accentuated everything I have worked at and taught for over thirty years, and in addition I have verified in practice the *utility* of these, to me, primitive principles. I am not, however, prepared to admit that his method of carrying out the details of the artificial respiration is the best possible. His objections to the Sylvester method are evident and true, but his objections to the Marshall Hall method are neither evident nor true.

Dr. Howard claims that by his method there is a greater exchange of air. This may be so, but I do not remember to have seen that he has ever measured the relative amounts of air exchanged in the two methods, and during our experimental researches in 1856 we found that on bending the spine backwards *expiration* took place from the abdominal muscles dragging upon the lower part of the thorax.

But even if I admit that more air is introduced by Dr. Howard's method, I contend that that is, if anything, an objection to it, for, as I have pointed out, air too forcibly inspired, whether by traction on the chest walls by means of the pectoral muscles, or by the rapid recoil of ribs and

diaphragm previously very strongly pressed upon, only drives the fluids deeper into the air-cells.

Theoretically one may, too, be doubtful as to the inspiratory power of this recoil, in the position of the body advocated by Dr. Howard, for not only are the lower ribs dragged upon, as I said before, by the overstretched abdominal muscles, but a large organ of several pounds' weight, like the liver, would have to be lifted at each recoil.

It is by no means easy, moreover, on a river's bank for the uninitiated to arrange properly the patient's position; his clothes, folded and placed beneath the back, would not be sufficient to maintain the proper inclination of the body, and, even if this could be effected, it would practically be difficult to maintain continuously the "head-back" position that Dr. Howard advises. The movements employed to effect respiration would be continually shifting the position of the body, and would tend by pressure on the vertex to bring the chin and sternum into closer proximity.

Again, the long-continued dependent position of the head must be objectionable; apnœa implies a gorged condition of the right side of the heart and therefore of the vessels of the brain; to empty those vessels and lighten the oppressed nervous system should be our object. This position of necessity raises a barrier at once dangerous and difficult to overcome, even under less critical conditions. I do not see how this dependent position of the head can be defended, especially when one knows that in the hands of the unpractised, the removal of pharyngeal obstruction is not even by such a position absolutely certain to be effected.

In the Marshall Hall method, slightly modified to embrace the corrections of experience, we have, I believe, the best of all methods.

1st. It is truly a very "ready method" and requires no apparatus.

2ndly. The instructions are easy to be understood by ordinary unprofessional people.

3rdly. On account of the immediate adoption and con-

tinued use of the prono-lateral positions this method is more to be trusted than any other for keeping the pharynx clear of obstruction.

4thly. It empties the stomach and gradually clears the lungs of the watery and frothy fluids, and will surely and gently introduce sufficient air at each inspiration to take the place of the fluid which has been expressed.

5thly. The pressure, applied to the back when the patient is prone, exerts an influence on the heart, the blood is moved onwards towards the lungs which are by the next movement opened up to receive it, and thus the right side of the heart and the cerebral vessels are relieved of the engorgement which we know to exist.

6thly. The safety of the patient is more perfectly secured by keeping him on one side during the whole treatment, one lung being thus kept quite free.

7thly. In apnœa, or, after a time, in drowning, when the upper lung is believed to be freed from water and frothy mucus, if more air is required, it can be introduced by elevating the upper arm above the head each time the patient is turned on his side, an addition, in part, of the Sylvester to the Marshall Hall method.

A patient in a state of apnœa or syncope with greatly diminished circulation needs but little air for the preservation of life, and in drowning still less, on account of the presence of water in the lungs. It would be better to lay the patient on one side and trust to nature alone than to have recourse to measures which would cause the forcible inspiration of air, before the evacuation of water had been successfully effected. Artificial respiration, although undoubtedly the best and really only remedy when properly applied, becomes a source of increased danger if used injudiciously and too violently. It is not necessary in the Marshall Hall method to place a roll of clothing or anything else to elevate the chest when the patient is prone; we found by experiment that elevating the chest, even for a few inches, when the patient lay on his face, caused *expiration*.

In this paper I have not alone passed in rapid review the general question of drowning, but I have demonstrated some new principles upon which our future treatment should be based, principles not theoretical, but which have stood the test of experiment and have been already many times successfully applied in practice. It only remains for me to express an earnest hope that this Society will see its way to reconsider the whole subject and express itself freely and fully for the guidance of those Societies to which the public looks more immediately for instruction and help.

APPENDIX.

The following notes and observations appertain so essentially to the subject of drowning generally, that I think it desirable to add them to my paper.

Brodie's 'Pathology,' p. 70.

"In some instances, after remaining for a considerable time in a state of coma, respiration is again suspended; so that if recovery had been effected in the first instance by means of artificial respiration the animal may be said to die a second time. In others, although sensibility is restored, and with it the power of locomotion, it is only for a time; another attack of coma follows, and this is fatal.

"These statements are founded chiefly on experiments made on the lower animals, but there is no essential difference between the phenomena which occur in them and in the human subject. The case which I am about to mention justifies this observation. It was communicated to me by Mr. Rose, under whose care the patient was placed. A boy of the name of William Claridge, seventeen years of age, attempted to hang himself on the evening of the 17th of July, 1820. He was discovered after a short period of suspension (the exact length of the period being un-

known), and immediately cut down. He was at this time completely insensible; his face was livid, his lips were of a dark purple colour, the pupils of his eyes were dilated and motionless, his pulse not perceptible at the wrist. A pair of bellows being at hand, artificial respiration was immediately had recourse to. In about a quarter of an hour the diaphragm began to act. The artificial respiration was now discontinued. He breathed at irregular intervals, with stertor, and a rattling noise, from the air passages being choked with mucus. The pulse was now perceptible, but often flagging, and the surface of the body was disposed to be cold. The countenance was still of a livid hue, but the breathing became more frequent and regular, and there was also an improvement in the pulse. At the end of another hour an attempt was made to take some blood from the arm, but it was not successful; and from the coldness of the surface of the body it was thought expedient to place him in a warm bath. During the night he continued to breathe; the stertorous breathing continued. In the morning a vein was again opened in the arm, and twelve ounces of blood were taken away, but no relief followed. He continued insensible, cold on the surface, and frothing at the mouth, and died at the end of twenty-four hours from the time of his having been cut down.

"The body was carefully examined. The vessels of the brain seemed to be turgid, with dark-coloured blood, but there were no other morbid appearances."

The case above related is an instance of what may be called secondary apnœa, and the cause of death is evidently looked upon by Sir Benjamin as some failure in the nervous system; whereas from my observation on the causes and course of "mucous stertor," I am led to believe that death ensued in this as in other similar cases from bronchial suffocation, a sort of suffocative bronchitis, and that if the patient had been placed on one side and left to nature he might have survived,—the patient was really drowned by his own mucus.

I visited some of the principal receiving houses on the

banks of the Seine, and found that what the men in charge knew and employed in their treatment was derived from English methods, the Marshall Hall and the Sylvester, and that they jumbled the two systems indiscriminately, and used first one and then the other as the fancy took them. The men were very convinced that the patients sometimes recovered after a much longer immersion than was generally supposed.

Dr. Waters, of Liverpool, showed that blood easily passed through the lungs in apnœa if blood was removed from the pulmonary veins ('Medico-Chirurgical Transactions,' vol. xlv).

A butcher, when the ox is knocked down and pithed, quickly opens up its chest in front of, or as we should say in man, above the sternum and freely severs the innominate artery; the blood of course at once rushes out in enormous volume, but it soon becomes a feeble stream; the man or men then commence artificial respiration by pressing forcibly on the hinder ribs with one leg and releasing the pressure rhythmically at intervals, the animal being on its side. Air passes freely in and out of the nostril with force sufficient to blow out the flame of a large taper or suck it in, on ex- or in-spiration, in accordance with the respective movements of the chest wall; the blood-stream, which had become feeble and sluggish, now rushes out with almost as much violence as at first, and for a short time in almost as continuous a stream,—a very good experiment, I think, to show in practice both the truth of Dr. Waters's observation and the value of artificial respiration conducted in this way, in carrying on the circulation and relieving the oppressed right side of the heart.

Notes on a Drowned Porpoise.

In October, 1889, I was engaged with my assistant, Mr. John Stainer, in investigating the internal anatomy of the porpoise. On cutting into the trachea, which was strong and large (one inch in diameter), and completely

surrounded by its cartilaginous rings, I was surprised to find it three parts full of sanguinolent spumous fluid. On squeezing the lungs, more frothy fluid exuded, and with it a number of slender white worms four or five inches in length. The lungs themselves were dense and spongy, and here and there were cysts containing worms in embryo. From these conditions I inferred—

1st. That the animal had been drowned in the element in which it lived.

2ndly. That its larynx must be closed or the fluid would have drained away or have been poured out or have evaporated during the many rough handlings the creature had been subjected to since its death three days beforehand.

Further inquiry and investigation corroborated these assumptions, for the animal had become entangled in a fishing-net deep under the water, and was thus deprived of its breathing requirement, air, and brought up dead.

On dissecting the pharynx from behind, I found that the larynx passed upwards and forwards as a tubular prolongation far into the postnarial cavity, and that about one and a half inches below its orifice it was encircled and firmly clasped and closed by the palatopharyngeus muscle. It would appear that the laryngeal tube was, when in a state of rest, kept closed by this outside sphincter (the palato-pharyngeus), so as to prevent the untimely entrance of water when the animal was beneath the surface of the sea. The tubular portion was composed of the elongated cornicula or cartilages of Santorini above and the epiglottis in front and below, loosely joined together by soft expansile tissue and mucous membrane. The cavities of the mouth and nares were completely separated by the velum-palatinum.

The fluid extracted from the bronchial tubes amounted to six drachms; it was of sp. gr. 1026, precisely the same as the sea water in which the animal was drowned.

CAMBRIDGE; Sept. 14th, 1889.

MY DEAR BOWLES,—About a fortnight ago I was called in consultation to see a gentleman in the country who a few days before had been thrown out of his dog-cart on to his head; he had been seen by Professor Humphry a few days previously, and in his absence the local doctor sent for me. I found the patient lying on his back and making such a noise during breathing that one might have heard him half way down the stairs. I looked at my patient and immediately realised the danger he was in; his throat was full of mucus, which was oscillating between his velum and trachea or some higher point. He was quite insensible and every now and then, in the midst of irregular and shallow breathing, associated with a tremendous rattle, he seemed as if he were going to choke instanter. Your aphorism, "Turn him on his side," immediately occurred to me, and in less time than it takes me to write this, the noisy breathing had almost disappeared. I had him turned at first somewhat on his face, to let a quantity of mucus run out of his mouth and then left him, with strict injunctions to his attendants that he should on no account be allowed to lie on his back. When I first saw him I was exceedingly alarmed and thought that he had but a short time to live, for he had deep stertor, a bluish face, and swollen, turgid veins. Had I not been sent for I believe the patient would have been dead before many hours had elapsed—instead of this, on visiting him the next day, his wife said that he had been sleeping "beautifully and quietly." He gradually regained consciousness and is now convalescent.

Ever yours sincerely,

E. CARVER.

(For report of the discussion on this paper, see 'Proceedings of the Royal Medical and Chirurgical Society,' Third Series, vol. i, p. 137.)

REMOVAL BY OPERATION

OF A

GANGRENOUS APPENDIX VERMIFORMIS

CONTAINING A FÆCAL CONCRETION.

SECONDARY LAPAROTOMY THROUGH THE LINEA ALBA FOR SUPPURATIVE PERITONITIS. RECOVERY.

BY

SIR DYCE DUCKWORTH, M.D.,

AND

JOHN LANGTON, F.R.C.S.

Received March 18th—Read June 11th, 1889.

Arthur S—, æt. 16, was admitted into St. Bartholomew's Hospital on November 8th, 1888, under the care of Sir Dyce Duckworth, suffering from pain in the abdomen. His past history was good, as was also his family history.

His present illness dates from November 3rd, when he had a large breakfast of sausages and minced meat. Not long after he was seized with pain in the abdomen, followed by vomiting and diarrhœa. He took some castor-oil on the morning of the 5th, after which his bowels were opened, but have not been since. He vomited again on November 6th and 8th. He has lost his appetite and sleep.

The patient is fairly well-nourished, lies quietly in bed,

curled up on his right side, with his knees drawn up. He is drowsy and answers questions slowly but accurately. Complains of pain in the lower part of the abdomen. Pulse 100°, temp. 99·6°.

The abdomen is slightly distended, and tympanitic on percussion. On palpation nothing can be felt, but there is some tenderness in the lower part of the abdomen, perhaps more marked on the right than on the left side. The rectum is empty, but on the right side of the pelvic cavity and above it can be felt a somewhat resistant mass, which is tender to the touch. He was given small doses of opium.

At midnight he had some spasmodic attacks of pain in the lower abdominal region, which lasted some minutes. His aspect is sunken, indicative of abdominal trouble. Pupils small, but equal. Lips dry, covered with brown sordes. Tongue dry and brown, except at the tip and edges, where it is red.

The lungs and heart-sounds are fairly normal.

Abdomen: The girth at the umbilicus is twenty-five and a quarter inches; more tumid than in the afternoon. Dilated veins, especially distinct over the right iliac fossa, are seen on the surface running vertically upwards along the side of the abdomen to the thoracic veins. Tympanitic note all over the abdomen, except for two inches above the pubes. There is a slight projection of the abdominal walls just internal to the right anterior superior iliac spine, which is tympanitic. The abdomen is tender generally, but most so in the neighbourhood of the swelling. He has passed about five ounces of urine, but with pain and difficulty. Urine 1·025, acid, slightly turbid, and contains a faint trace of albumen. No vomiting since admission.

November 9th.—Vomited twice early this morning. Has had several sharp attacks of pain in the abdomen, more on the right than on the left side. Passed flatus, but no motion. Abdomen still distended, but the superficial veins are not so marked. Mr. Langton was asked

to see the case in consultation with Sir Dyce Duckworth, and after the bladder had been emptied the patient was carefully examined, when they came to the opinion that the symptoms pointed to trouble in the neighbourhood of the cæcum, probably in the appendix vermiformis, and that operation was called for.

The patient was removed to the operating theatre, and placed under an anæsthetic. An incision was made in the right linea semilunaris over the iliac fossa. The peritoneal cavity was opened by an incision three inches in length, when some flaky lymph was exposed. On examining the cæcum about an ounce of very fetid pus welled up, and after it was all evacuated it appeared that the appendix vermiformis was gangrenous to the extent of two thirds of its length. In the tube at the junction of the gangrenous and healthy portions was felt a solid body, which proved to be a fæcal concretion. The healthy appendix was very lightly ligatured, so as to obstruct its lumen, but not sufficient to strangulate its blood-vessels. The gangrenous appendix with its contained concretion was removed, the mucous membrane, and subsequently the serous surfaces, were separately sutured. The portion of the abdominal cavity around the cæcum and its neighbourhood was freely washed out by several quarts of hot Sanitas water at a temperature of 100° F., the coils of the agglutinated intestine being gently separated, so as to allow the enclosed pus to escape whilst the abdomen was being washed out. A drainage-tube was inserted into the peritoneal cavity, and the edges of the wound were brought together by carbolised sutures. The wound was dressed with iodoform gauze.

The concretion, which was the size of a cherry-stone, consisted of inspissated fæces.

The patient was given one grain of Ext. Opii every four hours until 5 a.m. He slept from 11 to 5, and was fed by nutritive enemata every six hours.

11th.—Wound was dressed twice to-day, and some pus came away. Bowels opened at 5 p.m.

The patient progressed well up to November 17th, the temperature up to this time being subnormal. On this date the patient complained of pain in the region of the wound. Half a grain of the extract of opium was administered, but the pain increased. On removing the dressings the house surgeon found a large blood-clot distending the wound. The clot was removed, and as the source of the hæmorrhage could not be discovered, the tube was replaced by a plug of iodoform lint, and the wound tightly bandaged. In the afternoon the wound was dressed, and a quantity of dark clot and grumous blood was removed, but there was no further hæmorrhage.

22nd.—The patient's temperature rose early in the morning, and on dressing the wound more pus than usual escaped, but otherwise the wound looked well.

23rd.—There is a slight fulness with tenderness in the left iliac region. Temperature normal. Pulse 72.

25th.—Slept well. The swelling in the left iliac fossa is less marked and not so tender; otherwise well.

26th.—Patient slept fairly well, but has complained of pain in the left side of the abdomen. On examination the swelling in the left iliac and hypogastric regions was found to have increased and to be more tender. The average temperature lor the last two days has been considerably higher, and his general condition is not so favorable. A rectal examination did not reveal anything.

On these general grounds Mr. Langton believed that there was some localised suppurative peritonitis on the left side, probably due to an extension of the original peritonitis, and therefore advised a laparotomy in the median line. This was done by making an incision through the linea alba for about two inches, midway between the umbilicus and the pubes. The peritoneal cavity was carefully opened so as to avoid injuring any part of the intestines which might be adherent to the abdominal wall. Immediately on the division of the peritoneum a large quantity of extremely fetid pus was evacuated. The encysted pus was contained in a cavity

which extended to a considerable depth towards the left iliac fossa and down into the pelvis, but not in the direction of the right iliac fossa. The pus was apparently shut off from the general peritoneal cavity by adherent intestine, which localised the suppuration.

The cavity was freely washed out with warm water. A Keith's drainage-tube was inserted into the abscess cavity, and Keith's dressing was also used.

27th.—A large quantity of sero-pus escaped. The bowels have acted once this morning. The cavity was irrigated with Sanitas water.

December 3rd.—An india-rubber tube was substituted for the glass tube.

6th.—There is some induration in the left iliac fossa just above Poupart's ligament. With this exception he is doing well.

February 6th.—The indication mentioned in the last note subsided in the course of a few days, and the patient is doing well in every way. Since December 12th the patient has gained 12 lbs., weighing now 5 st. 3 lbs. The first incision has completely healed for some time, the second one has a sinus extending down for three inches. He is allowed to get up.

23rd.—The sinus has lessened to about an inch in depth. The patient is now quite convalescent.

Remarks by Sir Dyce Duckworth.

The history, physical signs, and general condition of the patient appeared to indicate very plainly that he was suffering from typhlitis, and there was every reason to fear that a general and fatal spreading peritonitis would soon supervene.

The case appeared to me a suitable one for abdominal section, and exploration of the parts about the caput cæcum coli, with the prospect of finding disease of the vermiform appendix. Mr. Langton agreed to this opinion, and urged

the operation. I entertain no doubt that if surgical interference had been delayed for twenty-four hours a fatal issue would have ensued, and no measures other than those taken could, as the operation disclosed, have proved of any avail.

The result was eminently satisfactory and encouraging. In by far the majority of cases of this kind the appendix is found to be the focus of the mischief, and if by chance one attack is permitted to subside, it is almost certain that recurrent inflammation will be set up subsequently, and no recovery be ultimately secured. Under such circumstances it is plainly the duty of the physician to hand over the case to the surgeon to be dealt without further medical treatment or delay.

Remarks by Mr. LANGTON.

Mr. Treves has estimated that in 70 per cent. of cases of Typhlitis the trouble lies in the appendix vermiformis, and Dr. Fenwick's tables further show that out of 129 cases in which examination had been made, concretions, hardened fæces, and foreign bodies accounted for forty-seven cases. As this was the first attack the lad had suffered from, and as there was no evidence of any tubercular disease elsewhere, we had a good inference for thinking that some concretion was the exciting cause.

I selected the right linea semilunaris as the best site for the incision, as it would enable me to open the peritoneal cavity without being too near the appendix, where adhesions were not unlikely to exist. This is, I believe, a better place for the incision than one through the linea alba, so strongly advocated by Dr. Gaston in the 'Journal of the American Medical Association,' vol. ii, 1887. It is more advantageously situated for a complete examination of the appendix and its surroundings, and affords a better basis for manipulation. It is not, however, so convenient for washing out the peritoneal cavity, should the suppurative peritonitis be diffused.

The appendix is liable to large variations as to length and position, as to freedom and attachments, but its normal direction is upwards and inwards behind the cæcum, and is consequently more accessible by an inguinal than a median incision.

Most surgeons are agreed that it is preferable to defer surgical interference until the acute symptoms have subsided, but in this instance we had no option, for the patient was already beginning to show signs of perforation.

Viewing the unfavorable statistics of this lesion of the appendix and the nearly certain outlook of recurrence, we think that operative interference should be undertaken more promptly as affording the patient the best chance of recovery. Early operations would moreover find the parts much less firmly matted together and render the operation less formidable than when undertaken after several attacks. Should pus be found around the appendix or among the coils of the matted intestines, drainage would, we think, afford greater security, but, if otherwise, the abdominal wound should be sutured and closed.

The second attack of suppurative peritonitis was due, probably, to an extension from the original seat of the lesion of some confined pus which had not been released from between the intestinal coils at the first operation.

This patient did not exhibit a symptom which has been occasionally observed and which is stated to indicate perforation, viz. marked pain in the genital organs, cases of which have been recorded by Dr. Tiffany and Dr. Gaston.

(For report of the discussion on this paper, see 'Proceedings of the Royal Medical and Chirurgical Society,' Third Series, vol. i, p. 142.)

TWO CASES

OF

PARTIAL OBSTRUCTION OF A BRONCHUS BY A FOREIGN BODY,

WITH

REMARKS ON THE OPERATION OF TRACHEOTOMY FOR ITS REMOVAL.

BY

THOMAS BRYANT, F.R.C.S., M.Ch.,

CONSULTING SURGEON TO GUY'S HOSPITAL.

Received April 9th—Read June 11th, 1889.

Michael P—, a tanner, æt. 49, was admitted into Guy's Hospital under my care on April 17th, 1886. The day before his admission, when sucking a button, he fell asleep, and awoke gasping for breath, but this difficulty rapidly subsided. On recovering his breath he remembered the button and looked for it, but without success; he was then led to think that he might have swallowed it, or that it had gone down into his chest. The button was about three quarters of an inch in diameter, with a shank. He coughed voluntarily for some time to bring the button up, but without avail; later on he took an emetic and vomited, but no button was ejected. He then came to Guy's.

On admission the man was coughing much and expectorating a good deal of mucus, but the cough was not paroxysmal. He had had a cough for many years and been expectorating for many weeks. The breathing generally was rough, but the râles seemed to be louder on the left than on the right side of the chest, and air also appeared to enter the right more than the left lung. Dr. Goodhart was asked to see the patient, and the following day he reported :

"There is a marked diminution of respiratory murmur on the *left* side of the chest, as stated by the reporter. This extends down the upper half of the lung, but is less marked at the base. I am, however, inclined to doubt whether this means that the button is still in the left bronchus, because the patient is a deep-chested man, and there is a long wheezy expiration all over the chest, associated with a good deal of inspiratory sibilus, and he tells me that he has often had a bad cough in the winter, and therefore the deficient expansion of the left lung may easily be explained by some inequality of the disease on the two sides. I should therefore advise the man be simply watched."

During the next two weeks the man went on much as usual, and his cough remained about the same. He now maintains that he feels the button in his right bronchus, and that the moment he turns over on that side he commences to cough. The coughing is periodical, not incessant.

On May 13th Dr. Goodhart again saw him, and reported :

"The patient looks altered, he is of an ashy-grey colour, and has very laboured respiration. He has now a patch of tubular breathing at the base of the right lung, with sharp crepitation. There is still much bronchitic wheezing all over the chest, but more on the right than the left side. Expectoration purulent. No fœtor. Larynx healthy."

"I am still," adds Goodhart, "unable to see any certain relations between the symptoms and the button, although it is of course possible that they may be due to its pre-

sence in the bronchus. On the former examination the left side if any seemed involved; on the present it is the reverse."

With this uncertain view of his case the man refused to allow me to do what I wished, and operate upon him.

On May 31st the man was apparently better, and he did not expectorate so much. Dr. Goodhart reported, "The man is much better, chest much clearer. There is still, however, much tubular breathing of a whiffing character at the base of the right lung, and considerable dulness. Pulse regular."

On June 12th the man left the hospital, twenty-six days after his admission.

On July 20th, six weeks after his leaving Guy's, he was taken into the infirmary of St. Saviour's parish, as his cough had much increased, and he felt ill. Dr. Gross,

FIG. 1.

who has medical charge of the infirmary, reported that the man on his admission was very much emaciated, and had a constant cough, with profuse expectoration of fœtid pus. The whole of the right side of his chest was dull, and there were loud numerous râles throughout. He died on August 4th, exhausted.

At the post-mortem made by Dr. Gross, the button was

found in the position indicated by the drawing (1) resting on the spur formed by the first bifurcation of the right bronchus. It was lying quite loose transversely in profile, and had set up very slight ulceration of the parts against which it had pressed (*vide* preparation 1717[12], Guy's Museum). The whole lung was consolidated. Diffuse suppuration existed throughout, and there were numerous small cavities containing pus, which were probably due to a general bronchiectasis.

Case 2.—Robert H—, æt. 7, and living at Banstead, was admitted into Guy's Hospital under my care on the evening of August 5th, 1886, having three hours previously when blowing a toy trumpet swallowed or inhaled the mouthpiece which had become detached. The accident did not cause any special symptom beyond a momentary cough. The boy was taken at once to a medical man who examined him with a laryngoscope, but saw nothing abnormal. He was then brought to Guy's. On his way by train he amused his fellow passengers by blowing the trumpet when taking a deep breath or coughing.

On admission the boy was breathing naturally and seemed well; there was no constitutional disturbance. When the boy coughed or took a deep inspiration with his mouth closed, the note of the trumpet was clearly sounded. When the nostrils were closed and the mouth opened no note could be obtained.

When I saw the boy the next day I carefully explored the nose, thinking from the above fact that the foreign body might have lodged in its posterior chamber; and at the same time I examined the pharynx and laryngeal orifice, but this examination yielded no result. The chest on careful investigation seemed to be normal, as nothing abnormal could be made out, and no sound of whistling was heard.

The boy was therefore left alone and kept quiet in bed. On the eighth day after his admission the patient was

unable to blow the trumpet by any respiratory effort; there was, however, no cough and no chest symptoms. Temperature 98·8°. On the twelfth day cough appeared, and it was then for the first time palpable that air entered the right lung better than it did the left.

. Dr. Carrington who saw the case at this time reported, "There is very deficient entry of air into, and movement of, the left chest. I cannot find any physical signs of pneumonia. I should judge, however, that the foreign body is in the left bronchus."

On the following day, therefore, or thirteenth after the accident, I was led by this report to open the trachea with the view of removing the foreign body. For this purpose the child was placed upon a light table and given chloroform. A free incision was made so as to expose at least an inch of the upper part of the trachea, and in this incision the isthmus of the thyroid gland was divided without bleeding. The trachea was then opened and the table tilted upwards at the foot, the head of the child at the same time being made to hang over the other end. The thorax was then succussed on its posterior as well as anterior aspect, but without any good result. I then with a long silver bent probe sounded the trachea and bronchi with their branches, the head of the child being still dependent, and after repeated attempts at last struck in the left chest what sounded like a foreign body. With the forceps I now show you (Durham's) I then removed the whistle from the chest, having passed the instrument exactly five and a half inches from the lower limit of the wound in the trachea downwards into the chest before seizing it. The drawing now handed round (No. 2) was copied from one taken at the time of the operation by my friend Mr. Gowan.

The foreign body, which was composed of a tube of tin, when removed measured $\frac{15}{16}$ths of an inch in length, and $\frac{6}{16}$ths in its largest diameter. Its narrow end, which measured $\frac{4}{16}$ths of an inch, presented downwards. Its lumen was only partially blocked by the structure which

formed the whistle, and consequently at least half its circumference was patent for the passage of air.

FIG. 2.

After the operation the wound was carefully bathed with iodine water, dressed with narrow strips of iodoform gauze made soft by being dipped into a mixture of terebene one part and olive oil four parts, and subsequently well pressed so as to get out all superfluous fluid, and covered with Gamgee tissue. The boy was then placed in bed in a small ward tent, into which water vapour was introduced. The boy's evening temperature was 100·6°.

The next day everything was most comfortable, although

there was a little emphysema about the wound. The boy's respiration and pulse were normal; temperature 98·6°.

On the third day the wound was dressed and was found to have nearly healed. The same kind of dressing was applied. The boy had still a little cough.

On the fourth day no abnormal symptoms existed, consequently the steam tube was given up.

On the fifth day the boy was taken out of his tent and placed in a ward bed, and by the ninth day he was convalescent. He left the hospital on September 12th, quite comfortable, and when I saw him a month later was as well as he had ever been.

Remarks.—Cases of partial obstruction of a bronchus, in which the foreign body, by its gravity, is of sufficient weight to maintain its position, and yet is neither of such a size nor of such a form as to mechanically prevent the ingress and egress of air into the lung for respiratory purposes, are of sufficient rarity to justify their record; and the lessons to be learned from the two examples I have to-night brought under your notice seem worthy of our consideration.

In both cases the initial paroxysm of respiratory difficulty which followed the introduction of the foreign body into the trachea was brief and feebly marked.

In Case 1 the man awoke gasping for breath, but speedily recovered, and it was not till he recalled the fact that he went to sleep sucking a button that he was led to suspect that he might have swallowed it, or that it may have travelled downwards into his chest.

In Case 2, that of the boy, the inhalation of the foreign body did not cause any special symptom beyond a momentary cough.

In neither case was there, on the patients first coming under notice in the hospital—in one twenty-four and in the other four hours after the accident—any laryngeal or respiratory symptom to support the diagnosis of foreign body in the trachea or one of its branches, which the his-

tory of the cases had suggested, unless stress be laid upon the fact that in the case of the boy the whistle was sounded on a forced expiratory effort. This sound, it is to be noted, was only elicited on a forced nasal, and not oral, expiration.

In Case 1 such a trustworthy stethoscopist as my colleague, Dr. J. Goodhart, is known to be was inclined to doubt, even on the second day after the accident, whether the symptoms he found were to be explained by the presence of the button rather than by the chronic bronchitic changes from which the man had long suffered, and in Case 2 nothing whatever abnormal could be made out in the boy's chest on a careful examination, and it was not till the eighth day when the sound of the whistle on a nasal expiration was lost, and the twelfth day, when cough appeared, with physical chest symptoms, that it became clear that the left bronchus was more or less blocked.

As a matter of fact it may be said that the primary physical signs and symptoms of bronchial obstruction were in both cases of so unpronounced a character as to give little or no support to the diagnosis which the histories of the cases had rendered so highly probable ; and it was not till the secondary changes had taken place in the lungs, from the local irritation caused by the presence of the foreign body, that anything like a certain diagnosis could be made.

The fact that, in Case 2, the whistle sounded only on a forced nasal expiratory effort, and that the sound could neither be obtained by a forced oral expiration, nor heard on auscultation, is somewhat puzzling. It suggested to me at the time that the whistle must have found another resting place other than a bronchus, and induced me to explore very fully the upper laryngeal and nasal cavities.

The uncertainty of diagnosis in both cases consequently led to delay in treatment, and with an unfortunate result ; for in Case 1 it rendered my advice to the man, to submit to an operation, somewnat half-hearted, and it at the same time supported him in his natural wish to avoid what, to

his mind, seemed a severe operation. In Case 2 it likewise encouraged a delay, which might have proved very serious. To my own mind, these two cases very forcibly illustrate the evil of a procrastinating practice in this variety of accident, and more than suggests the expediency of performing the operation of tracheotomy in every case in which even a suspicion of the presence of a foreign body in the trachea or one of its branches finds the least support, from either the history of the case or the physical phenomena which may be present.

To wait for a certainty in diagnosis is often to wait too long. The risks of a tracheotomy operation *per se* cannot be looked upon in any way as serious, when compared with the certain evil which attends the presence of a foreign body, which, from its weight, cannot be expected to be expelled. I would much rather occasionally perform an unnecessary operation than leave a patient to his almost certain fate with a foreign body in his lung.

The opening into the trachea was a free one, and as a result no difficulty was experienced in the subsequent manipulation. I explored the tubes with the child's head and body in a somewhat dependent position, and believe that by this measure some advantages were gained, such as the avoidance of any lung irritation from the trickling of blood into its structure, and the ready escape of all secretions. Nothing could have answered better for the exploration of the bronchial tubes, or for the removal of the foreign body than the forceps I employed, for as soon as I felt the whistle with the blades of the closed instrument I caught it on opening and closing them.

Into what division of the left bronchus the foreign body had descended I cannot say, but as exactly five and a half inches of the instrument were passed through the tracheal wound before the foreign body was caught, and the patient was only seven years old, the distance must have been great.

(For discussion on this paper, see 'Proceedings of the Royal Medical and Chirurgical Society,' Third Series, vol. i, p. 149.)

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